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THE BOTANY OF THE ABOR EXPEDITION

BY

I. H. BURKILL,

Director of Gardens, Straits Settlements, formerly in the Botanic Survey of India.



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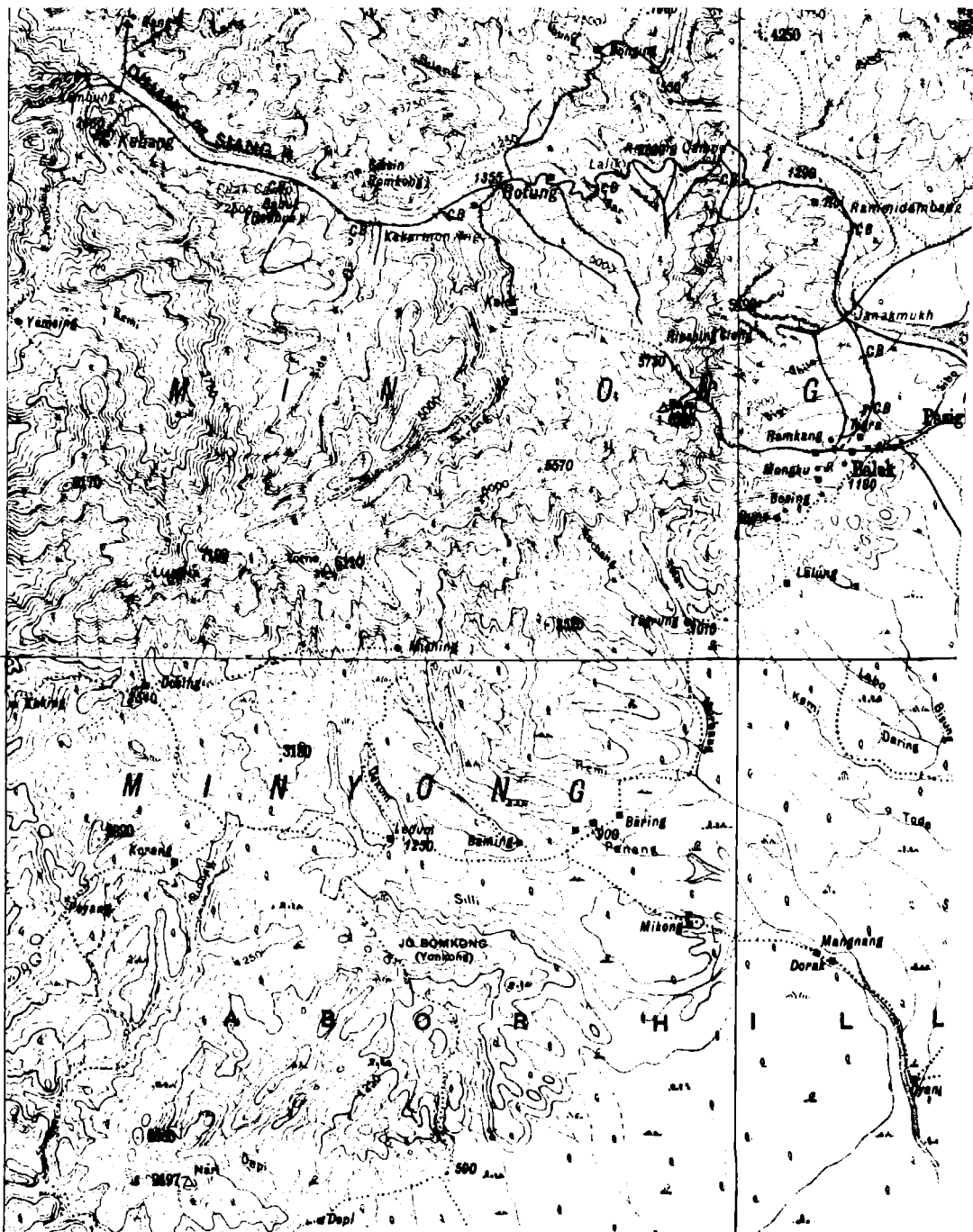
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BOTANY OF THE ABOR EXPEDITION.

Outer part of the Abor Hills with the plains below
them, showing the author's wanderings
as continuous red lines:

THE BOTANY OF THE ABOR EXPEDITION

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PART I.

Introductory and a general view of the vegetation of the outer Abor Hills and of the Plain just under the Hills.

It fell to me, in the middle of the Hot Weather of 1911, when acting as Director of the Botanic Survey of India, during the leave of Colonel A. T. Gage, to propose to the Government of India that a botanist should be told off to accompany the Abor Expedition ; and to my gratification, after Colonel Gage's return, I was sent.*

On November 15th, 1911, I left Calcutta to join the force, only, when already so far on the way as to be at Lunding, to receive a telegram postponing the date for joining. To return was unreasonable, and therefore I continued my journey, but first to Makum and then to Sadiya, instead of to the base camp at Kobo. From Sadiya I reported myself. After a few days at that outpost, which I had visited in August, 1909, I received instructions to proceed, and joined at Kobo on November 29th.

I had with me two plant-collectors, one Kalka Pershad Tewari of long experience in my office, the other a Nepali, named Manbir. We remained with the expedition until March 11th, 1912.

The line of work taken.

It was obvious, from the time of my joining, that wide explorations would not be possible : in fact, it was always necessary for me to bring back myself and my guard to one of the camps before nightfall. These camps lay in a string from the Brahmaputra River at Kobo to the headquarters by the mouth of the Yambung stream ; and a little off the line was the post of Balek. I used all the camps, and once was able to remain for two nights in a camp under Pongging, so covering a section of ground from the middle of the Assam plain, through the outer line of the Himalaya, and a short distance into the

* For an account of the Expedition the reader may be referred to Angus Hamilton's "In Abor Jungles" (London, 1912) and to A. Bentinck's Paper in the Geographical Journal, XLI, 1913, pp. 97-114.

second line of hills. Before the Abor expedition, the outer line (but never the inner lines) of the Assam Himalaya had been collected in ; this twice, once east and once west of the Abor hills. The collecting upon the east was done in 1836 by William Griffith, who penetrated the Mishmi Hills over the spurs of the mountain of Leinphlanj. The collecting on the west was done by Colonel J. L. Lister upon the Daphla expedition in 1874. Griffith was a highly trained botanist who found most interest in collecting with the idea of ascertaining the variety of the plant world : but a diligent collector all the same. Lister collected to elucidate the nature of the plants of the Daphla hills. I, also, determined, from the conditions under which I was at work, to study above all the vegetation before me from the geographic standpoint, and to try to read the influence of past and present climates on it. To do this it was necessary for me to endeavour not to overlook plants whether flowering or sterile, and to try to identify as much as possible of the flora ; consequently at times, and especially, when about to be turned out of the hills, it was necessary to dry imperfect specimens, which have caused my list to contain a fair sprinkling of specifically undetermined plants.

The plants low in the natural system of classification could be of but little use to me in my particular object, because their geographic distribution is yet so little known. I collected them as I was able, but did not devote as much effort to the seeking of them as of the higher plants. Material of tall trees was collected by the aid of a shot gun. An anaëroid barometer and a camera went with me everywhere ; and for a time I had wet and dry bulb thermometers in camp, though to little good effect. The altitudes obtained from my anaëroid readings were checked as far as possible by reference to Captain G. F. T. Oakes of the Trigonometrical Survey party.

To obtain as many plants in flower as possible, I moved backwards and forwards along the line, and I stationed my experienced collector about two marches behind me, that I might have a pair of eyes on the watch for that which had not been in flower when I passed. Having a collector behind me gave also another advantage, for thereby there was an economy in transport, as it was easy to send to him down the line by the food-supply coolies half-dried plants for finishing ; but the carrying up the line of full supplies of drying paper over two marches that could be avoided, was a consideration. It was at all times necessary to keep the weight of the collections down, and under these circumstances my Diary was made to serve as much as possible. It became a record of 8,000 observations supplementing the notes with the specimens.

From the Officers of the force I always had the greatest consideration, and not a little help. I owed my first sight of the big flowers of the parasite, *Sapria bengalensis*, to Lieut. G. M. McClaverty ; my Abor tea to Capt. G. F. T. Oakes ; the measurements of the largest trees to Colonel W. Bailey and Lieut. H. F. F. Marsh ; aconite roots to Lieut. McClaverty ; several

orchids to Major-General D. C. Macintyre, Captain Oakes, Colonel E. H. Sweet, Captain the Hon. M. deCourcy, Lieut. H. W. Andrews and Major E. H. S. Cullen.

The excellent postal arrangements of the Expedition enabled me to send a certain amount of living material to Calcutta, whence most of it was redirected to the Lloyd Botanic Garden in Darjeeling. My collections of dried plants were, likewise, posted down to the Royal Botanic Gardens, Calcutta, where Colonel Gage, Director of the Botanic Survey, told off an assistant, Mr. (now Prof.) S. Banerji, to make a preliminary examination of them. The Bryophyta were by him, in chief part,* picked out; and with the kind help of Mr. G. B. Savery the mosses were sent to Mr. H. N. Dixon, and the hepatics to Professor F. Stephani. Tubes of Algae, which had been collected, were at the same time sent to the late Professor G. S. West. These Algae have been worked out by Dr. Nellie Carter and will be enumerated in a paper by her in the Records of the Botanical Survey of India. The present paper enumerates the rest of the collections.

After the expedition was over, I was obliged to take leave, and at the conclusion of it proceeded, not to India, but to Singapore. Towards the end of my leave, the collections which had been retained in Calcutta for the preliminary determinations, were sent to England, but unfortunately arrived at Kew as I was sailing. However, Sir David Prain, Director of the Royal Botanic Gardens, Kew, kindly permitted Mr. (now Prof.) W. G. Craib, then Assistant for India at Kew, to take up the work of determining the undetermined plants and of verifying Prof. Banerji's determinations. As regards the first orders from Ranunculaceae, Prof. Craib did so; but when he left Kew soon after, work on the collections ceased, and owing to the Great War it became impossible to get other assistance, or in any way to proceed until I took leave again in 1919. Then I returned to the Royal Botanic Gardens, Calcutta, to verify myself, the bulk of Prof. Banerji's determinations, and in its unrivalled Indian Herbarium to draw together notes on the distribution, in India, of my species. After that, taking again to Kew what I could not determine in Calcutta, for the second time I sought the help of Sir David Prain, and he very kindly allowed Mr. S. T. Dunn, now the Assistant for India at Kew, and Mr. C. H. Wright, a Principal Assistant, to work through my difficulties. The result has been a series of descriptions of new species in the Kew Bulletin. I had other help there also,—from Dr. O. Stapf, the late Mr. J. R. Drummond, the late Mr. R. A. Rolfe, Mr. W. B. Turrill, Miss D. K. Hughes and Miss E. M. Wakefield. To all these named above I tender my very best thanks, and in addition also to my wife for much help in various ways.

* Mr. Dixon's paper in the Records of the Botanic Survey of India, VI, pp. 57-73, covers the first consignment of the mosses; the rest of the mosses reached him only in 1919, and are for the first time enumerated below.

From what has been said it will be understood that I am responsible in the main for the determinations.

The vernacular plant-names which I collected are not as well attested as I could wish. The reader, recollecting that for the first part of the Expedition we were at war with the Abors of the Minyong tribe, will understand that there was no collecting of Abor names then. It was only towards the end of my time in the Hills that I was able to get any native names.

For the same reason,—namely that we were at war—it was not easy to get full information about their cultivated plants. They had reaped everything of the Rain-crops that they could carry off before we appeared among their villages, and they had sown few Cold-weather crops.

It is now evident why it has taken eleven years to complete a report which ought to have been ready in two.

In the report the lowest plants have been given the sequence of Engler's *Pflanzenfamilien*, the ferns that of Beddome's *Handbook of the Ferns of British India* and the Spermatophyta that of Sir Joseph Hooker's *Flora of British India*.

I am convinced that, in all scientific matters, the metric system should be used ; but as regards altitudes, thought is so natural in feet, and instruments of British make so invariably read in feet, that it is impossible to get away from them ; and while giving in my enumeration and elsewhere measurements of parts of plants in metres, I have felt obliged to give altitudes in feet ; but to be as consistent as possible, I have added the metric equivalent in each case. The altitudes I read to hundreds of feet only, and no reader would expect greater accuracy. In recording the readings, to have omitted the altitude in feet while converting it into the exact equivalent in metres, would have been to give the idea of a fictitious exactitude ; and on the other hand to have rounded off the altitude in metres would have increased the inexactitude. No other course therefore was possible than to give both.

I include Sadiya within the area of the report ; and doing so I call the area under discussion Abor-land, because Sadiya and the adjacent plains are added to the Abor Hills. Seeing that the Miris, who live in these plains are in all respects, but situation, Abors, the adoption of the word " Abor-land " can be justified.

The nature of the country.

A journey of great charm is that up the Brahmaputra in the late rains. The full river is brown, but its swirls and eddies compensate for its colour ; and it carries the steamer so high that the passenger is above the banks. These banks offer a succession of white or fawn-coloured reed-beds ; trees fill the middle distance ; and the distant mountains, north and south, belted with rain clouds, limit the horizon with ultramarine. As the top of the valley is approached, these mountains rise nearer and close the way in front, rendering

what has been beautiful for the several days of approach, still more beautiful. The "khadar" or low flooded land is now less in amount and the reed-beds narrower; the "bhangar" or land which escapes annual flooding, is now wider, and with the change, there is greater space for the growth of trees, with the result that where man has not suppressed it, there is forest. Some little way above Dibrugarh, the first stones are met, the river making a rapid over them. This spot, Silonimukh (that is stony river mouth) marks the commencement of the sill of the mountains. Some forty miles beyond is Sadiya.

Sadiya, for long the outpost of India to the north-east, lies nearly centrally in the amphitheatre of mountains, very much among great rivers, which roll down to it, attesting by their size the enormous rainfall of its neighbourhood. Sadiya is upon the sill of the mountains; and the Brahmaputra passes over rapids below it for forty miles before it really leaves the sill. This sill is terai, though the word is not applied to it in common parlance in Assam. Terais are malarious belts where unorganised man competes against nature without success; though firmly established kingdoms may establish outposts, and clear forests; but when the power of those kingdoms is weakened and the outpost stands unsupported the trees claim their own again. Instances can be found easily. Many centuries ago, the Hindu kingdoms of the Gangetic plain established Semraon in the terai of the Nepal Himalaya, but it fell with their overthrow by the Mohamedan invasion. Similarly, Kamartipur was established in the terai of the Sikkim Himalaya (*vide* Journ. As. Soc. Bengal, N. S. XII, 1916, p. 269). Similarly, too, in the top of the Assam plains, either some Chutia kingdom of the valley lower down, or some power which came earlier, built Kundina or Bishmaknagar to the north of Sadiya, and Sadiya seems to have risen after it. So long as these places flourished the land about them must have borne crops and been maintained in an artificial state. But in the 13th century a Shan tribe, the Ahoms, broke into the valley from the east, and in the 16th century, after much fighting in the immediate neighbourhood, dispossessed the Chutias of Sadiya. That there should have been much fighting indicates a considerable population and settled lands. Under the Ahoms, Sadiya slowly waned until in 1819 it was not rich enough to support one of the garrisons that the invading Burmese quartered up and down the valley.

Sadiya has not recovered by much since then. Though at the end of the eighteenth century Kamptis, bringing improved agriculture had settled, by permission, near it; and though it became a British outpost in 1825, it has remained a village up against the forest, little influencing it, little repressing it; and so long a time has gone by since the land carried any heavy population that the forest round its narrow stretch of artificial grass land, using a long familiar word, may be called in general virgin, or in a quite new expression may be stated as at its climax.

What is true of the forest by Sadiya, is most true of the forest by Kobo. Kobo lies down stream from Sadiya, an abandoned Miri village site, with a few signs of past cultivation. Unbroken forest stretches from it to the hills. This forest at Kobo and for a full march northwards grows upon loams; for a second march to the foot of the hills it grows upon gravels, the soil changing just as in the Nepal terai, which I described in the *Records of the Botanic Survey*, IV, No. 4, 1910, p. 67.

Forest continues as far as I went into the Himalaya; but the outer line of the hills drains off enough moisture from the prevalent southern winds to make the vegetation behind Bapu different from that upon its southern face; and it is evident that we can speak of two climates. Behind the outer line of the hills is the stronghold of the Abors; they are best developed in the second line of hills, doubtless because the drier conditions there give them better health. Balek and Aieng, their villages on the edge of the Plains, are as Sadiya to the Chutias, outposts; and the influence of man upon the forests about them is less than in the interior of the hills. The section then, that I deal with, is from the edge of the plains cultivation, through the submontane forest, and the forest exposed to the intensest rains, to the Abor cultivation beyond, a section which I divide into four zones as follows:—

Zone 4. North of the divide along the outer line of hills.

Zone 3. South of the divide, the wettest hill faces.

Zone 2. The submontane gravels.

Zone 1. The loams of the centre of the plains.

The zones 1, 2 and 3 are zones of increasing wetness. Kobo is 396 feet or 121 m. above sea level, Pobamukh 373 feet or 114 m. and Sadiya 426 feet or 129 m. From this the ground rises about 200 feet or 61 m. to the foot of the hills. The outer line of hills rises in Bapu to 6,266 feet or 1,910 m. Fifteen miles east of Bapu, but unvisited, there are two peaks exceeding 10,000 feet and there are many more north of them over Damroh. One of these was visited by an exploring party, and they brought back the information that the summit bears Conifers and Rhododendrons (*vide* the footnote below).*

A Rhododendron was found within the area of my wanderings; but if, as surmised the Conifer of the peaks of 10,000 feet is an Abies, no such tree occurred within my area, and I did not reach the region of alpinism at all. East of the 10,000 feet peaks which are 15 miles from Bapu, the outer line falls, but at 35 miles from Bapu, again rises to above 10,000 feet and continues

* "I climbed a 10,000 ft. hill north of Damroh on which there was snow two to three feet deep. The snow commenced at 9,500 feet. From 9,000 feet to the snow at 9,500 feet the trees were stunted and covered with enormous quantities of moss; they included rhododendrons, which continued practically to the summit. From 9,500 to 10,000 feet there were bamboos. At 10,000 feet conifers commenced, not pines but cedars which were rather like deodars, they went to the top, but were never very thick. The actual peak was covered only by Ringals (*Arundinaria*), but very thickly. I saw similar cedars on the neighbouring hills, but there seems to be a very thin stratum of them wedged in between the permanent snows and the deciduous jungle." (G. F. T. Oakes, in a letter dated 13th February 1912.)

high to about 50 miles from Bapu, where the mountain of Leinphlanj, attaining 10,930 feet, stands over the very corner of the Assam Valley. On November 15th, 1836, Griffith attempted to botanise to its summit, but failed apparently by a considerable altitude, and no mountain tops of the Himalaya of Upper Assam exceeding Bapu have been botanised on yet. Prince Henry of Orleans in 1895 was in a region of pines upon the shoulders of Dapha-Bum on December 5th, where there was then snow, but I believe he was unable to do any collecting at that stage of his adventurous journey. Dapha-Bum is east of Sadiya in the Singpho country.

The climate of Abor-land—a part of the area in India of greatest humidity.

The outer Abor hills are uniformly humid and seasonally very wet; how wet has not been measured, but that this is as stated, is obvious from the large size of the channels of the rivers, which descend towards Sadiya, and carry much water during the rains, though the sources of many of them are not distant. Sadiya, from the records of the thirty-eight years preceding 1913, receives annually 103·1 inches of rain (that is 2629 mm.) with 130·6 rainy days.* The relative humidity has not been recorded. In the months when least rain falls, early morning fogs indicate the air to be then saturated. There are no dry months, but December has only ·60 inches (15 mm.) of rain and less than two rainy days. July has 20·05 inches (509 mm.) of rain; and is the wettest month by a little.

The records of Dibrugarh* may be used to suggest the relative humidity of Sadiya, and are given in the following table:—

	Sadiya.		Dibrugarh Observatory.			
	Average rainfall.	No. of rainy days.	Average rainfall.	No. of rainy days.	Max. & min. temp. F.	Relative humidity.
January	1·69	5·0	1·76	3·9	70·6-49·3	96
February	2·82	8·1	1·94	4·9	72·2-53·9	92
March	6·48	12·0	4·33	8·2	77·7-60·2	86
April	10·64	15·4	11·83	15·7	79·5-65·3	89
May	11·17	13·6	9·22	14·3	84·4-70·5	89
June	15·77	16·6	18·97	20·1	87·1-73·9	92
July	20·05	19·5	20·23	22·0	87·2-75·4	93
August	17·16	17·2	19·65	20·9	86·7-75·7	93
September	11·07	12·5	12·64	14·7	87·0-74·8	92
October	4·77	6·9	4·26	7·6	84·5-69·5	89
November	0·97	2·1	1·31	2·4	79·2-59·9	89
December	0·60	1·7	0·36	1·0	73·1-50·3	95
Whole Year	103·19	130·6	106·50	134·8	87·1-49·3	91

Dibrugarh's minimum relative humidity is 86; and in Dr. Gilbert Walker's tables every place in India where observations have been taken, at one season or another, becomes drier than this except Sibsagar, Bishnath, Doom-Dooma, Dikom, Golaghat, Hailakandi and Jorhat, which are in Assam,

* Gilbert T. Walker, in *Memoirs of the Indian Meteorological Department*, XXII, 1913.

and Dam-Dim, which is in the Eastern Duars of Bengal. Doom-Dooma, which lies south of Sadiya, exhibits a minimum average monthly humidity never below 92, and has 130 rainy days with 96.74 inches of rain (2457 mm.).

Whatever the average humidity of Sadiya is, it is unlikely to be lower than that of Dibrugarh; and it is reasonable to class the station along with those named above, as having the greatest and most uniform relative humidity within the whole of India and Burma. No hill-stations in India are quite as uniform.

The outer Abor hills are apparently still more humid than Sadiya. Over the months from June to October travel in them is extremely difficult. November and December bring a considerable number of fine days. January brings the rain upon which the Abors sow their early rice, but it is not wholly wet; February is wetter, and dull damp conditions persist until May, when they lift a little and for a short time. But, as throughout the Himalaya, the rainfall appears to decrease rapidly as the mountains are penetrated, the valleys become pleasanter, though the peaks by rising above those on the outside catch the wet winds and get the muffling of moss characteristic of such places.

During the expedition, Captain J. O'Neil, I.M.S., kept weather and temperature records, which he put at my service. For the drier month he recorded:—

<i>Dates.</i>	<i>Place.</i>	<i>Clear or fine days.</i>	<i>Cloudy days.</i>	<i>Rainy days.</i>	<i>Temp. F. maximum.</i>	<i>Temp. F. minimum.</i>
October 2-November 5	Kolo	12	2	10	95°	59°
November 6-November 9	To the foot of the Hills.	3	1	..	85°	54°
November 10-November 25	Kobo	3	5	6	78°	52°
November 26-January 6	At the foot of the Hills.	28	5	6	74.5°	49°
January 7-January 9	Up the line	3	..	..	65°	51°
January 10-January 19	At the foot of the Hills.	1	1	6	67.5°	51°
January 20-February 20	Rofung	12	10	26	75°	48.5°
		62	24	54	..	..

Between November 26th and January 18th most of the records are for Janakmukh, at a little above 600 ft., where after sundown a draft of cold air sweeps on to the plains, as it does out of the Teesta and other similar Himalayan valleys. The river Dihang at Janakmukh on January 4th, 1912, had a temperature of 49°F. which was approximately the minimum air temperature at that date.*

For the short time at the end of the expedition, when I had wet and dry bulb thermometers with me, I read them whenever I returned to my shelter and also whenever I awoke in the night. By them on two days at the end of February, the humidity at Kobo was found to vary from 72 to saturation;

* Griffith in October found the Lohit, near its exit from the Mishmi Hills, constantly below the air temperature, but not so its tributaries. (Journal I. p. 22.)

at Renging camp over two days from 83 to 97 ; and at Rotung camp over three days from 76 to saturation. On most days, in valley bottoms, the perspiration streams down the traveller's face upon any effort ; and the air seems to border on saturation.

These valley bottoms are indeed steamy places, wherein the vegetation of the Abor Hills contends with overmuch moisture and with the inability to transpire. And this must particularly be so in what is here distinguished as Zone 3,—the hill faces of the outermost line of the Himalaya that oppose the humid wind and cause it to ascend and drop, in ascending, a large part of its moisture.

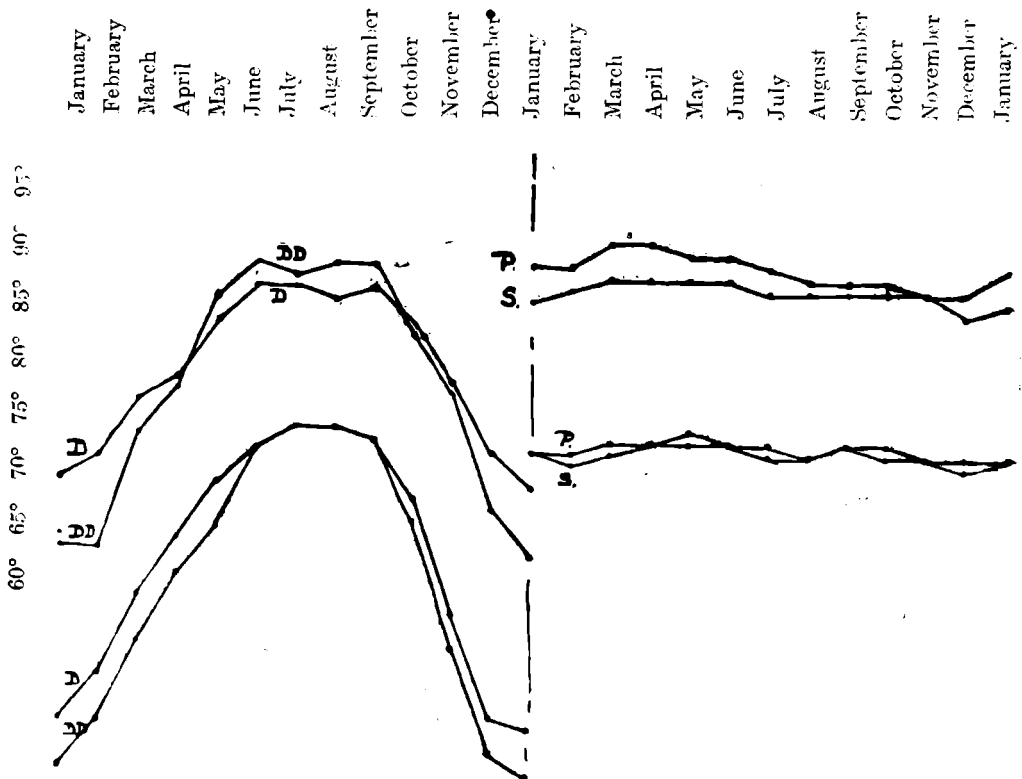
The foliage throughout Abor-land with very rare exceptions is that which characterises the rain-forest ; it distributes the rain over its surface, and is not waxy.

SEASONAL DISTRIBUTION OF TEMPERATURE.

AVERAGE MONTHLY MAXIMA AND MINIMA TEMPERATURES.

Dibrugarh and Doom-Dooma.

Penang and Singapore.



It is convenient to remark in passing, at this point, that the climate of the upper Assam plain as regards humidity, is that of Singapore, while as regards average temperature it is about 8 degrees (Fahrenheit) lower.* Later we shall have occasion to call Singapore a wet trough and exactly the same applies to the top of Assam. Both places are the extremes of very humid areas, but as the diagram of maxima and minima temperatures on page 9 shows, Assam and Malaya seasonally are very unlike. We shall have need of this comparison later.

It is to be noted at once that these temperature curves for upper Assam are symmetrical with July maxima like north temperate temperature curves and are quite unlike typical Indian temperature curves with earlier maxima, and three seasons per annua.

The Soils.

In the immediate neighbourhood of the Brahmaputra, the forest grows upon a confusion of old sand banks, and deposits of good soil, all the rivers' handiwork, which in local parlance is called the Khadar.

Under the hills are beds of gravel, which make a porous soil, bearing a peculiar forest. In the outer hills, the Gondwana series exhibit sandstones and shales; and the results of the weathering of these are most diverse soils. Further back the Abor volcanic series also weather diversely but with less of the extremes, for though there is sandstone (Kebang) there is very little however, and that merely as a parting here and there in the varied volcanic rocks; and on the other hand there is very little of a rock that breaks down into a greasy clay (Babuk). There is so little of these extremes that no connection of species in the flora with either could be established within the duration of the expedition.

The soils of the hillsides were observed sometimes more stony, and sometimes less so, but nature is so busy that a great accumulation of humus overlies everything.

A Question of Nomenclature in Phyto-geography.

To my mind "region" is the term to apply to the largest divisions into which we divide the surface of this world, when studying the life upon it; it is most sanctioned by usage; and it has no precise and confusing political significance. It is greatly preferable to the term "area" which has been used. The first sub-divisions of regions may with no chance of misunder-

*But the Singapore and the Penang temperatures are town-temperatures; and town-temperatures are higher than country-temperatures such as the Assam temperatures are (*vide* Hann, *Handbuch der Climatologie*, i., 1908, p. 38): but it appears that the Singapore town-temperature is yet higher above the uninvestigated temperature of the surrounding country than are the town-temperatures of Europe above the adjacent country-temperatures, so that one feels as if the recorded average temperatures, showing a difference of 8°, make slightly too much difference: and that, little as it appears, it should be less.

standing, be called sub-regions; and logically the second sub-divisions are then sub-sub-regions. These C. B. Clarke (Journ. Linn. Soc., London, XXXIV, 1898, p. 1) called sub-sub-areas and they are more or less what German Phyto-geographers have been calling "provinces" (a term, from its old and very defined political use somewhat objectionable, just as is "kingdom" which they often use for region). The remoter sub-divisions of regions are vegetative formations, associations, etc., down to the ultimate sub-divisions of the Ecologists.

C. B. Clarke recognised as one of his sub-sub-areas, the Himalaya from a little within the western boundary of Nepal to the Dihang River, and as another, the valley of Assam and all the hills to the south of it to the Burma boundary. His were trial sub-sub-areas, with tentative boundaries. It is obvious that they do not hold without revision, as indeed is the case with our phyto-geographic sub-sub-regions over almost the whole world, chiefly because of the superficiality of our knowledge of plant-distribution, and secondarily because the boundaries of regions, sub-regions and sub-sub-regions are never absolute. Sir David Prain, dwelling on this, has shown very clearly in the introductory chapter to his *Bengal Plants* (Calcutta 1903) p. 4, how we are driven by this vagueness to define by political frontiers the limits used in the books we call "Floras." The word "area" is appropriate then for use when we speak of the artificially limited "Flora."

Engler in his *Pflanzenreich*, IV-23, 1920, p. 4, dealing with the distribution of the order Araceae, after remarking how difficult it is to define the limits of phyto-geographic regions, adds, "Die unterste Region eines Landes ist bestimmend für die Zuteilung zu einem Florengebiet"—the lowest area of a stretch of country is that which determines its assignment to a phyto-geographic "region," (Engler uses "Region" where I use area and "Gebiet" where I use region)—which is a turning away from the difficulties.

The regions and their sub-divisions are means to an end: convenience must determine their number; and the only logical approach is by a search for major and minor lines of separation, between vegetation of one appearance (to the botanist more than to the eye) and vegetation of another, irrespective of the cause of the appearance, be it elevation, or be it soil, or be it the past geologic history of the world, that is to say, by contrasting whole floras and not picked conspicuous species only. To take the lowlands only with Engler, is to pick species. To take the lowlands is indeed doubly wrong, for if any species in a Flora ought to be put on one side in making the comparison, it is those species which do not hold a place in any of the climax associations of the area of the Flora; and they are the more numerous in lowlands than in mountains because man's cultivation and his other operations are the more intense in the lowlands than in the mountains and to a corresponding extent enable plants not really characteristic to exist. It will indeed be a refinement in reserve for future phyto-geographers to compare

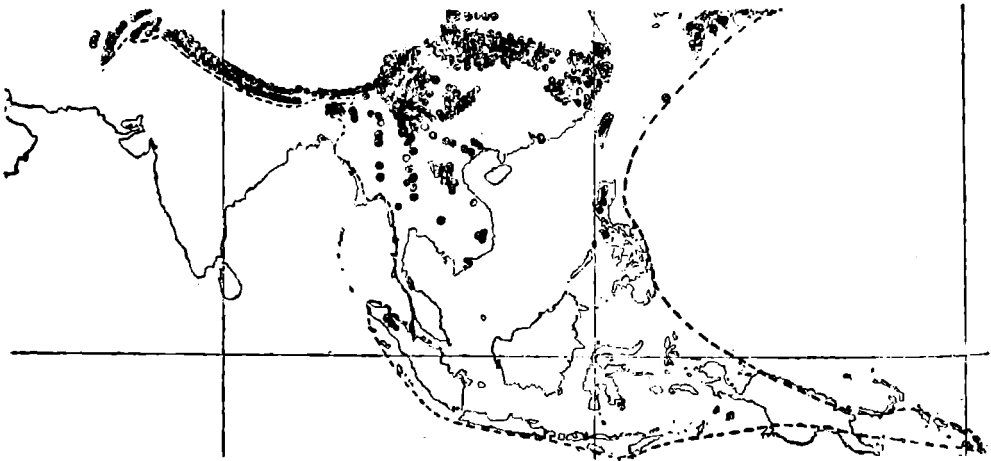
the species of climax associations region by region, sub-region by sub-region, etc., and the species of seres region by region, etc., the better to construct a map of the vegetation of the world.

My mental picture of the Phyto-geographic map of the world has sometimes broad and sometimes narrow belts of colour between regions, sub-regions, etc. There is a very broad belt, for instance, across the Himalaya from north to south ; but a very narrow belt along it near its foot in the north-western half, the first representing the gentleness or the second the abruptness of the changes that occur. The narrow belt is what is here called the Asiatic Cupuliferous boundary line.

I am of opinion that the time has not yet come to define sub-sub-regions in north-eastern India. In default I use the words :— (1) Assamese, to indicate plants more or less confined to Assam and the hills from Sikkim to Chittagong ; (2) Assamo-burmese, if extending thence into Burma with the exclusion of Tenasserim ; (3) Assamo-malayan, extending further to Tenasserim and the western parts of Malaysia ; (4) Himalayan, extending along the chain ; (5) Himalayo-burmese, extending into Burma ; (6) Himalayo-malayan, extending into Malaysia ; (7) Himalayo-chinese, extending into China ; (8) Indo-burmese ; (9) Indo-malayan ; (10) Indo-australian, for plants with a distribution from the Deccan peninsula to Burma, Malaysia and Australia, respectively.

Pinus fails to enter the area under discussion.

There are no pines in Abor-land, not because the altitude forbids them, but because the excessive rainfall does. Four species approach the area,



Pinus in south-eastern Asia and the Cupuliferous boundary line.

Pinus excelsa, *P. longifolia*, *P. khasya* and *P. Merkusii*; and one of these *P. khasya*, is demonstrated cultivable in Dibrugarh. It is of some interest to look at their distribution in north-eastern India.

The first species, *P. excelsa*, is characteristic of the interior of the north-western Himalaya, is found in Nepal and reaches Chumbi and Rinchinpong in the interior of the Sikkim Himalaya.

The second, *P. longifolia*, belongs to the outer ranges and descends to the edge of the plains, making pure forest under the North-western Himalaya and the Nepal Himalaya; but under the Sikkim Himalaya it is absent, yet found within the mountains at a little distance back where the excessive moisture has been reduced, and so also in Bhutan. It may be that it is in Abor-land behind the limit of my explorations.

The third species, *P. khasya*, makes pure forest in the Khasia Hills, but, just as *P. longifolia* is absent from that face of the Sikkim Himalaya which gets the full south-west monsoon current, so is *P. khasya* absent from the immediate neighbourhood of Cherrapunji, the wettest place in India, and from it for about fifteen miles northwards. It descends on the north face of the Khasia plateau to Nangpoh to 1,700 ft. (518 m.) and, as said, can be grown in Dibrugarh at less than 400 ft. (122 m.) elevation.

The traveller to Manipur from Bengal passes through evergreen mixed forest for some way and at a watershed, where we may assume that the rainfall has been sufficiently diminished, emerges suddenly on to savannah land, with scattered *P. khasya*. This pineland extends fairly widely, and enters, the Upper Chindwin district of Burma at Koni: northwards in Manipur the pines increase in abundance, making magnificent forests, which cross the border into the Naga Hills near Kohima. Southwards, the pine is in the Chin Hills; and eastwards again after an interval it appears in the Myitkyina district in the neighbourhood of Htawgaw and in the Sanse gorge, whence we may believe it to extend somewhat northwards, as the pine seen by Lieutenant E. Pottinger in the Kachin country to the east of Long. 98°35' would seem to be it (*Records of the Botanic Survey*, I, 1898, p. 217); but it is as yet unknown from contiguous China. Southwards it is in the Ruby Mines District, east of Toungu in the rugged region of Nattoung, and in the Trans-Salween Shan States down to and also across the borders of Siam, very plentifully at about 2,500 feet (762 m.) above the sea.*

The fourth species is *P. Merkusii*, which occurs on the edge of Yunnan, in the Shan States, and behind the Dawna range in Tenasserim, at the head of the Toung-yin valley, and in Sumatra.

Seeing that pines are always associated with savannah land, it is evident that the rainfall operates through the competition of the dicotyledonous trees, that thrive where it suits them.

* Prof. J. F. Rock, who recently travelled from Bangkok to Yunnan, has very kindly sent me the following notes upon *Pinus* along his route. He passed by Chieng-Mai, from Doi Suteop over which *P. Merkusii* is already recorded.

Letter dated Jan. 31st, 1922, from Kengtung. "*Pinus khasya* and *P. Merkusii* are very common at Pang-kia at 3,000 ft., on the head waters of the Meh-Lao, three days' journey from Chieng-Mai towards Chieng-Rai. Then again before reaching Ban-Hue-San, I passed through

Wilcox, who penetrated the Mishmi Hills in 1826,—and his statement is supported by the statements of the intrepid men who have followed him,—reported the occurrence of pine-trees where the Halai River runs into the Brahmaputra, twenty miles as the crow flies east of the extreme top of the Assam plains, and north of the mountain of Daphabum; the country is described as very like the Manipur pine-country, being grass-land with the pine-trees dotted and in groups about it. On Daphabum, Prince Henry of Orleans met with pines, also, at an elevation where snow lay in December. What the species of pine was we do not know; and as, with one exception, China and India possess different species, it is unsafe to guess.

Oaks, Chestnuts, Betula and Engelhardtia occur.

There are several species of *Quercus*, and of *Castanopsis* in Abor-land, one *Betula* and one *Engelhardtia*. Not one of these genera penetrates into the country south of the Ganges, which is a fact worthy of remark: nor do they pass into Africa south of the Sahara. The line where they end seems to have a considerable significance in geographic botany; and accordingly I have marked it, as well as the distribution of *Pinus* in Southern Asia upon the map on page 12.

Four hundred and eighty genera of Phanerogams look down upon the Gangetic plains as *Quercus* does, from the Himalaya, and get into India no further, so sharp and real is this line which separates two phyto-geographic regions.

Westward of the Ganges, the line bends south and embraces the whole of the rain-forest region of Malaysia passing south of the Equator.

In America, also, *Quercus* attains in the mountains the neighbourhood of the Equator, and other northern genera pass southwards with it. They

a large grove of *P. Merkusii* at an elevation of 1,700 ft. At Ban-Pong-Pu-Fuang there were high ridges covered with pines, probably *P. Khasya*. Both places are seven days north of Chieng-Mai. On Dai-Chang, 23 kilometres from Chieng-Rai both species grow at an elevation of about 2,500 ft. This, Dai-Chang, was the last place within Siamese territory where I saw *Pinus*.

P. Khasya made its appearance in the Meh-len valley at a camp called Pang-Sop-Lao, eight days north of Chieng-Rai, and three days north of Muang-Len (which is also spelled Mong-Lin). Both species were again very common at two days' journey from Keng-Tung town, covering the ridges in great numbers up to 3,500 ft. *P. Merkusii* occupied the northern slopes of each ridge and *P. Khasya*, the southern slopes almost exclusively. Pines can be seen near Keng-Tung town upon the outlying hills."

Letter dated 18th February 1922 from Keng-Hung in Yunnan. "I nowhere found *P. Merkusii* upon this side of Keng Tung. Nine miles north-east of Keng-Tung upon a ridge at 3,200 ft. and near a village called Ban Sha, there were individual trees of *P. Khasya*, in dry jungle with *Schima* and Bamboo, *Castanopsis* and *Quercus*. Then in the Meh-Lin valley at 4,500 ft. this latter species was very common, forming large groves, and to the west of Meh-Lin there could be seen on the distant ridges, groves of Pines, which had the appearance of being of it. And again upon the eastern side of the plain of Muang-Hun in Chinese territory at 4,600 ft. *P. Khasya* was very numerous; and west of Muang-Hai; and, lastly, in the valley of the Meh-Nam-Ha, a few miles from Keng-Hung, the capital of the Hsip-Song-Pan-Na, at an elevation of 4,200 ft.

do so, because the crust of the earth is folded into north-and-south mountain-chains round the Pacific, and these have served as lines of penetration and as ways of escape to warmer climates in periods of refrigeration ; and also have caught the oblique winds ; whereas the crust of the earth upon its Atlantic side is folded into east-and-west mountain-chains, and east-and-west deeps against which in periods of refrigeration holocausts of species appear to have taken place.

Abor-land is where the two earth-systems meet, a veritable node in Phyto-geography. If we could make the world colder from to-morrow, the plants northward of Abor-land might wander in : if we could make it hotter, the Malaysian vegetation from the south might enter : if, by either change, we could let a new group of plants into the Western Himalaya, it might advance eastwards until Abor-land was attained. Is not the intense richness of species of south-western China due to the configuration there of the earth's surface having minimised the drawbacks of temperature-changes ?

Juglans has in the Himalaya the same boundary as the above genera. All of them go far back geologically, and their distribution is the result of a long history embodying among other events one clear disaster, namely, that which caused the destruction of *Engelhardtia* in Europe, in the end of the Miocene, when other allied genera evidently lost ground with it. The phyto-geographic changes which we see in that event, did not drive it, or any other of the genera named, (within our knowledge) to the south of the Cupuliferous boundary line ; nor did the Glacial Period effect such a thing ; which indicates that the line, *i.e.*, the barrier which made it, is old. It is more or less in the position of the east-and-west miocene mediterranean, which is known as the Tethys, a sea, the duration of which with vicissitudes, extended from pre-Spermatophyte ages to the midmiocene when it became broken up into lagoons.

The plan of the World is such that the south tropic particularly supplies moist winds to the Equator and the immediate north of the Equator passing from off the oceans against several roughly parallel land-barriers, *e.g.*, against the northern Andes, against the Guinea coast, against Malabar and also against the Asiatic Cupuliferous boundary line. These barriers are all Rain forest areas on their seaward side except so far as cold ocean currents affect them ; and they invite comparison. A large part of this paper will be a comparison with Malabar of the area on the Asiatic Cupuliferous boundary line which is Abor-land. I wish that I had the leisure and means to reverse the comparison and compare Malabar also with Abor-land ; but I have not.

The Effect of the Abors upon the Flora.

The heart of the Abor country lies well within the Hills, and no villages south of Komsing have any reasonable claim to be considered as within it ;

for perhaps the most prosperous of all the villages is Simong, thirty-five miles in a straight line from the Plains, while Komsing is twenty-two. At such a depth into the hills the wind has lost much, we do not know how much, of the moisture with which it reached the outer line ; and the climate therefore is assuredly healthier and better for mankind. It is quite evident that the Abors increase in this healthier and better area, and, as Sir George Duff-Sutherland-Dunbar has well shown (Memoirs of the Asiatic Society of Bengal, V, extra no. 1915, p. 12-14.) throw their surplus population forward towards the Plains in the form of colonies, a movement possibly intensified by a pressure which he demonstrates to have existed for at any rate one hundred years from Thibetan folk, (l.c. 1916, p. 93), driving down the northern villagers. The colonies thrown southwards contend with malarious conditions such as, I believe, invariably break up a purely agricultural community, though they may yield before the attack of a trading community : and wave after wave of forward-moving Abors (like their predecessors, whatever they were) has doubtless spent itself in the movement, with, now and then, in periods of reinforcement, some effervescent raiding on to the Plains, and afterwards very gently Lethe. This condition has lasted so long, that the word permanent may be applied to it, and, I believe, that the effect of the Abors upon the vegetation is now merely what the effect of man has been for a very long period. I proceed to estimate the effect.

Above Yambung camp the Expedition established a signalling post, at an elevation of about 2,000 feet (610 metres) ; and from this eminence a good view is got into the heart of Abor-land. Due north of the post, Arte Hill presents a forest covered peak, 8,781 feet (2,676 metres) high : to the west of it, the Shimang valley lies relatively open, and back to distant snowy peaks : and west again, a ridge containing Mati-hill closes in the valley with forest : into the bottom of the Dihang valley, above the confluence of the Shimang, it is not possible to see, for the Dihang at Dosing on the north of Komsing, enters from the east behind hill crests, a crease across the Himalaya belonging to the Shimang : but rising into full view are the extensive clearings of Riga village, and nearer those of Komsing and Panggi. The clearings of Riu occupy slopes between the two. The plate opposite p. 289 in Hamilton's " In Abor Jungles " gives a part of this view, but does not produce detail.

The ratio of virgin forest to land showing the effects of cultivation appears, within this view, to be about three to two, the distant hills of course excluded. Now the Abors cultivate southern hill-faces and leave alone hill-faces that fall with any measure of steepness towards the north ; so that the ratio of virgin forest to land marked by cultivation, is possibly five to two for the whole face of the land in the neighbourhood of the villages, whose lands can be seen from " Signal Hill," namely, Panggi, Komsing, Riu, Riga, Dosing and the lower villages of the Shimang valley,—villages commencing immediately north of the map which accompanies this report.

Another panoramic view which I studied for the purpose of estimating the interference of the Abors was from the top of the Panggi clearings westward into the Siyom valley, and it gives a somewhat similar impression, namely that on the southern edge of the heart of Abor-land, three-fifths of the land carries undisturbed forest.

It may be that a little deeper into the heart of Abor-land this proportion is lowered; for instance, the wide fields of Komkar to which Bentinck directed attention in the *Geographical Journal*, xli., 1913, p. 102, and the favourable lands of Karko, to which Sir George Duff-Sutherland-Dunbar refers (l.c., p. 17), have eaten a little deeper into the forest; but nothing can be gained by discussing them.

Between the heart of Abor-land and the edge of the Plains, this three parts virgin forest in five increases until it is nineteen in twenty or possibly even more; and Zones 2, 3 and 4 of this report stand in series of increasing disturbance by cultivation.

The limit of cultivation is usually about 4,000 feet (1,219 metres); but clearings have been observed as high as 5,500 feet (1,676 metres).

Abor cultivation is in this wise. A site for a clearing is selected. Over the site the community jointly fells everything, unless it be a rare tree at wide distances, and burns off all that will burn. The site is now called A-rik, and the parts of it are allotted to the houses of the village, whose occupants sow the various plants among the larger timber, that having escaped the burning serves them as boundaries and as pathways. The functional clearing is now called Rik-lu. And as such it remains for one year, or two years, or sometimes three years, or, if close to the village and rich enough for more, up to five years at the most. Next, abandoned and weedy the Rik-lu is called Rik-pa; and as the woody vegetation comes back, Rik-ang.

The Abor Hills, of course, show land in all these stages of A-rik, Rik-lu, Rik-pa and Rik-ang; and the area actually bearing crops is not one tenth of the whole surface under the four.

The conclusion to be arrived at from this is, that an Abor village destroys the forest of at least fifteen times, probably of twenty-five times as much land as it has at any time under crops.

The Abors raise more food than they require themselves, and barter northwards, rice, millets and chillies for metal utensils and woollen clothes (Dunbar in Mem. As. Soc. Bengal V, appendix p. 8); but the excess of the cultivation amounts to very little.

Cultivation does not go so high in Abor-land as in the drier Himalaya, nor as high as in Sikkim; and I shall produce evidence to show that plants in general do not ascend to the heights that they attain in Sikkim. It has long been known that many distinctly temperate plants exist in the plains of the upper end of the Assam valley, showing that as they do not ascend so high, so they descend lower.

The cultivated plants of the Abors.

Rice is the chief grain of the Abors. They contrive a sowing of it in January and February; this sowing corresponds nearly in time to the broadcasting of "ahu" rice in Assam, and of "mayin" rice in Burma. They broadcast the larger part of their main crop in April and May; this being earlier than the main crops of Burma and Assam; but, with elevation, their season lengthens out considerably. They harvest the dry-weather crop about May, and the wet-weather crop from September forwards. At these seasons I was not able to see anything of their methods; but as the Panggi rice crops were still on the upper parts of the fields at the end of the year, I saw the harvest there; and I found only one race of rice, the same being also in the granaries of Kalek and Rotung, whence the fleeing Abors had not removed the whole of their grain.

Plate VI-A. of this report shows Abor women picking the heads of rice upon the Panggi clearings at 3,800 feet (1,158 metres) from a mixed crop of rice, Eleusine and Job's tears. The women were conscious of my presence, but quite unaware that I, alone, and seated on a log with my back to them, was paying any attention to their operations.

Eleusine coracana ripens with the rice; and is grown nearly as abundantly, in order that the Abor may swill his light beer or "apong," in the way in which all the hill-folk appear to do along the whole Eastern Himalaya.

Job's tears in the soft-shelled variety (*Coix Lachryma-Jobi*, var. *Mayuen*.) is grown in some quantity, and so is Maize.

Chenopodium album is grown in a 2-metres high race.

Of oil-seeds, the Abors use *Perilla ocymoides*, *Sesamum indicum* and a *Brassica*: of gourds, *Lagenaria vulgaris*, *Cucurbita moschata* and *Benincasa cerifera*: of beans, *Glycine Soja*: of tubers, the Sweet potato, the Common Yam and another yam: for a vegetable, the Chinese cabbage; and as a condiment, chillies.

They grow Opium, *Eryngium foetidum*, Tobacco and a very little Sugar-cane.

They plant for the fruit, mangos, peaches, jak trees and a sour pomelo-like citron. They, also, plant bamboos that they may eat the shoots.

Cotton is also an Abor crop, *vide* Sir George Duff-Sutherland-Dunbar (l.c., p. 41).

Of all that they plant, the Peach is the least suitable, and perhaps is grown as much for the beauty of its flowers as for its fruit. There is, as a rule a single tree of it in each of the southern villages; but it gives its name to one of them as if that one were once peculiar in possessing it. In no other plant grown by the Abors was there any hint of a feeling for the beautiful. Away north of the heart of Abor-land in the valley of Pemakoichen, the peach appears to be a feature of the landscape, and to bear abundantly: but among

the Abors southwards the cultivation of peaches is attempted beyond the places where they no longer ripen, just as is the case in Sikkim (cf. Hooker's Himalayan Journals, Minerva edition, p. 109).

The cultivation of *Perilla* and *Chenopodium* is distinctly a northern feature. The use of *Eryngium foetidum* is eastern; but the plant originally came to Asia from across the Pacific.

Clearings never go back to bamboo jungle.

Characteristic of certain parts of the East, are wide jungles of bamboo, sometimes of one bamboo or sometimes of another, which originate in clearings. These bamboo jungles seem to me to be worth a special study, because they characterise certain sub-sub-regions. But Abor-land is not in one of them; and high Rain-forest is the inevitable climax of all the changes or Seres in the vegetation, reached without any one in which bamboos prevail.

Dendrocalamus however makes a vegetative formation.

But in certain places, where the steepness of a hillside is suddenly increased, (probably some geologic changes determine the places), narrow belts of big bamboos appear, one of which is the subject of plate II B.

The narrow hunting paths of the Abors lose themselves in these belts because the culms fall across them so often, that no path remains constant.

PART II.

The biology of the flora of Abor-land.

There is a pleasing picture in the *Memoirs of the Asiatic Society of Bengal* V, plate 1, of the south-eastern slopes of Lumne hill : this hill is in a line with Bapu and the uninterrupted forest upon it which the picture shows is the same as on the other mountain. The forest is the climax vegetation of Abor-land. It exhibits modifications from place to place which have to be described and which arise either from altitude that is to say from the temperatures experienced or from soil-texture, that is to say from the water-supply at the roots. And again the vegetation shows artificial stages arising out of clearing by man and devastation or land-formation by rivers.

Climax and pre-climax forest of the khadar or land liable to flood.

A little back from the river-bank at Kobo the forest exhibits this structure :—

from the soil at	
46 metres.	} tall wind-dispersed small-leaved trees rising as pyramids and cones out of the verdure below.
44	
42	
40	
38	
36	
34	
32	
30	
28	
26	
24	
22	
20	
18	
16	
14	
12	
10	
8	} space in which light diffuses enough to enable a ground vegetation to survive below it.
6	
4	
2	
0	} herbs and low shrubs with rather small leaves.

It is at its climax in this stage, and without interference will not change in character.

But the river-bank, and the old river-channels which intersect the forest behind Kobo carry vegetation in all manner of stages or seres from the grass-clothing that a new sandbank gets to the pre-climax when the forest trees and the forest climbers grow interlocked in a struggle for mastery. It would

seem that the forest must win in the end : but the yearly flood of the rainy season helps the climbers, especially upon the river front, and it is certain that there the struggle is a very protracted one.

I have devoted Plate 1 in this Report to two views of the struggle. I A is of the Expedition's roadway close to camp. The widening of the way from a narrow track some six months before the view was taken, had been one factor in giving encouragement to the climbers, and their abundance is evident. I B is of the forest from the river, and shows a " Kobo " tree (*Kobo* is the Miri name for *Duabanga sonneratioides*) so sorely beset by climbers, as to be reduced to a few upper branches, the rest having been cast off by self-pruning as they could not be maintained. If this tree should become enwrapped it must die, as must the other tree in the background. The forest then, as seen in the plate, is in a pre-climax stage ; and the climbers make its most marked feature.

There are 86 climbers and sprawlers enumerated in this report as occurring on the khadar ; and of them 33 do not appear to extend into the hills. Some of the climbers attain very large dimensions : for instance one individual of *Vitis rumicisperma* was estimated as 90 m. long, and traced over several tree-tops : an individual of *Acacia Intsia* was found with a circumference at breast height of 32 cm. ; and one of *Mezoneuron cucullatum* with a circumference of 28 cm.

Kobo having formerly been a village of Miris, the forest behind exhibits marks of their interference as well as of the interference of the rivers, the rivers the more extensive.

In the patches of magnificent forest the light near the soil is greatly reduced. An attempt was made to ascertain the reduction and is thus recorded in my diary : —

6th December, 1911.—A considerable part of the day was occupied in measuring the light in the forest. Photographic paper coloured to standard in —

0 minutes	15 seconds	at 10	A.M.	in sun upon the roadway (seen in Plate I A).
1	"	15	"	in shade just off the road.
2	"	30	"	10-10 A.M. in shade a little further in.
8	"	50	"	10-20 " in shade where a <i>Piper</i> flourished.
19	"	10	"	10-40 " in shade about the top of a plant of <i>Chloranthus</i> ?
0	"	5½	"	noon upon a log on the river bank.
0	"	9	"	close to the same place on a log.
13	"	20	"	12-30 in shade about the tops of plants of <i>Piper</i> and <i>Myrio- neuron nutans</i> .
28	"	20	"	1-00 in shade about the tops of plants of <i>Coffea bengalensis</i> , <i>Piper</i> and ferns.

If on these figures we take the light on the river-bank as standard, upon the roadway the intensity was one-half, in the shade one-tenth and in the deeper forest from 1/70 to 1/240. The darkest place was about the tops of plants of

Coffea bengalensis, *Piper ?hymenophyllum* and *Athyrium spectabile*, while near by grew *Phrynium capitatum*, but not vigorously nor at all in flower. In yet deeper shade was *Elatostema sessile*.

7th December, 1911,—very fine weather.—I continued my observations upon the weakness of light in the depth of the forest. At 11 A.M., mean time, I made an observation on the bank of the river where the paper blackened in 8 seconds. Then I went inland nearly a mile and into a patch of forest that seemed suitable. A big *Dillenia* was just on the south side and overhead the canopy though not high was well tangled with *Vitis*, *Mezoneuron* and *Acacia*. There I pinned small pieces of photographic paper to leaves as follows:—(i and ii) to the topmost leaves on different sides of a plant of *Psychotria* 50 cm. high, (iii and iv) to the topmost leaves of a plant of *Piper* at 15 cm. from the soil, (v) to the topmost leaf of a small plant of *Psychotria* at 20 cm. from the soil, and (vi) to the topmost leaf of an unrecognised pinnate-leaved plant 30 cm. high. All were kept covered until ready and then the cover was shaken off and timing commenced. Little circles of sunlight fell through the forest, and as the sun and earth changed positions moved across the vegetation, so that no single piece of photographic paper escaped altogether; but so reduced was the light, evidently coming from no more than a very small fraction of the sun's disc, that they did not affect the paper rapidly. The first piece of paper was coloured to standard in 52 minutes and 30 seconds, then two together in 56 minutes and 40 seconds: the fourth was only coloured to standard tint in 1 hour 33 minutes and 20 seconds, and the other two only when 1 hour 56 minutes and 40 seconds had passed.

That done I went into the roadway (at 1-30 P.M.) and exposed a fresh piece of paper which coloured in the sun in 28 seconds.

From these observations taking again the river-bank as possessing standard sunlight the roadway light was reduced to two-sevenths, and the light falling upon the lowest layer of vegetation in the high forest reduced to 1/200, 1/350 or 1/400. The vegetation existing in this weak light consisted of an abundance of *Piper ?hymenophyllum* and of *Psychotria calocarpa*, a little *Chloranthus officinalis* and the unrecognised pinnate-leaved seedling. A little further in on one side was a yet darker area where vegetation gradually ceased, *Piper* and seedlings of the overhead *Acacia* extending furthest into it.

It is evident that the smaller plants on the ground depend very largely upon the diffusion of light which occurs between the lowest branches of the trees and their tops; and from that therefore it is not unreasonable to call the open layer in these forests, which is here between 2 and 6 metres from the ground, the light-diffusion space.

Walking through these forests, a man's head is in the light diffusion space, the half of his body among the plants of the ground vegetation, the forest canopy over his head commencing at about 6 metres from the ground, and

extending upwards in a measure which it is not possible to see : but from the examination of felled and artificially isolated trees upon the khadar it seems to extend to 22 metres, whence upwards the larger trees rise for at least as much again, the highest measured exceeding 50 metres.

In the Kobo forest *Terminalia myriocarpa*, *Alstonia calophylla*, *Cedrela febrifuga* and *Bombax malabaricum* are among the tallest of the trees ; and they have wind-distributed seeds. The lesser trees growing in their shelter are commonly animal-distributed. Some of them such as *Dillenia indica* and *Talauma Hodgsoni* drop their large fruits whole to break or be broken up upon the soil. *Hovenia dulcis* with a small dry capsule, but a sweet and succulent pedicel under it, drops the two together to get a second chance of transport after birds have already fed in the branches. *Gynocardia odorata* drops its large fruit to the soil to be broken up there : it exhibits also cauliflory whereby the fruits are exposed at a lower level than is normal in a tree of its size. Figs such as *Ficus Cunia*, *F. pomifera*, and *F. prostrata*, exhibit cauliflory is a still more marked degree, the fruits forming against the ground, and altogether within reach of a bird or animal upon the ground. The ground vegetation like the middle layer of the forest is also commonly animal-distributed, and the berries of the several species of *Psychotria*, of *Myrioneuron nutans*, *Ixora subsessilis*, *Coffea bengalensis*, Aroids, peppers, *Leea trifoliata*, *Chloranthus officinalis*, *Rhynchosyche ellipticum*, *Polygonum chinense* and *Pollia umbellata* are obviously intended to attract the attention of the numerous pigeons and other frugivorous birds of the region ; where even less attractive fruits such as those of *Alpinia allughas* or *Forrestia Hookeri* are toyed with by them if not eaten.

Big leaves in these forests do not occur in the layer exposed to the winds, but are found in the second layer which makes the real forest canopy, and again nearer to the ground. Selecting by eye typical leaves and measuring them I obtained the following as the size of some of the large leaves of the general canopy layer :—

	Sq. cm.
<i>Talauma Hodgsoni</i>	600
<i>Dillenia indica</i>	430
<i>Conocophalus suaveolens</i>	400
<i>Meliosma simplicifolia</i>	325
<i>Cinnamomum obtusifolium</i>	320
<i>Gynocardia odorata</i>	200

Not in the windy tops, but in the second layer, is the place where the epiphyte *Asplenium Nidus* occurs and it has large leaves—

<i>Asplenium Nidus</i>	550 Sq. cm.
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Given a small opening * in the canopy large and still larger leaves occur close to the ground, such as the following :—

	Sq. cm.
<i>Alpinia allughas</i>	1,400
<i>Amomum dealbatum</i>	1,050
<i>Phrynium capitatum</i>	1,000
<i>Alocasia fallax</i>	950
<i>Alpinia</i> sp.	825
<i>Clerodendron</i>	300
<i>Rhaphidophora Hookeri</i>	260
<i>Rhynchotechum ellipticum</i>	260

But under complete shade † the ground leaves are small as the following :—

	Sq. cm.
<i>Myrioneuron nutans</i>	150
<i>Forrestia glabrata</i>	125
<i>Psychotria calocarpa</i>	110
<i>Sabia lanceolata</i>	45—105
<i>Chloranthus officinalis</i>	90
<i>Micromelum pubescens</i>	45—75
<i>Piper hymenophyllum</i>	50
<i>Ixora subsessilis</i>	35
<i>Coffea bengalensis</i>	30
<i>Piper officinarum</i>	60—70
<i>Ficus</i> sp.	15

The above statements are designed to show that in general the tallest trees are wind-distributed and small-leaved ; while the medium trees may be animal-distributed and may be large-leaved ; and that the ground vegetation is likely to be animal-distributed having in the species of deep shade small leaves, but in the species of the alley-ways of the forest often large-leaves. Large leaved very tall trees are only found among the taller trees if also deciduous, such as *Bombax malabaricum*, *Sterculia urens* and *Kydia calycina* ; and of them *Bombax* keeps its leaves, and also it flowers later when existing in high forest (then always an old tree), than when existing in or upon the edge of the open chapris which will be described later. These three trees are bare from January into March. In March *Terminalia myriocarpa* changes its leaves, without going completely bare ; *Pterospermum acerifolium* also changes its leaves ; and at this time the shade plants, *Coffea bengalensis*, *Jasminum anastomosans*, *Glycosmis cochinchinensis*, *Conocephalus suaveolens*, *Tapiria hirsuta* and *Meliosma pinnata*, flower, along with many of the overhead trees.

* Sucker shoots, as being growths of openings in forest and like the plants of openings in forest, have large leaves. At Kobo sucker-shoot leaves of *Pterospermum acerifolium* measured 2,000 cm., of *Sterculia urens* 1,050 cm. and of *Kydia calycina* 375 cm., in all three cases much larger than are the typical leaves of these trees.

† Climbers, with heterophylly, that grow from deep shade towards the sun have small leaves in shade and large leaves above, as *Ficus scandens*, *Modecca*, many Aroids, and in the ferns as *Sterochlæna*.

The forests of the lower slopes.

The high forest of the hills differs from the high forest of the plains, in that upon a steep slope the uneven setting of the trees leads to exposure of their trunks, as may be seen in plate IX-B on the right hand side. In forests where this is the case, the amount of sunlight reaching the ground, according to aspect either early or late in the day, when the sun is low enough to shine under the crowns, is greater than in the level forests, so that though the total per diem may not be different, the diurnal distribution is different, and there results a marked effect, but the differences produced are at present inadequately studied.

The drainage produced by the slope doubtless works great differences in the vegetation.

But greatest difference of all is effected by shelter from the wind; and with that the next remarks deal.

The sheltered spots are the valley-bottoms, which are still and steamy upon most days of the year, and support a characteristic vegetation. Plate IV A is a view taken by the side of the Igar stream, the place a trifle more open than it had been by reason of the Expedition's road which is seen above the stream with a great wall of forest behind it. By the stream are plants of *Musa*, those with arched leaves being ascribed in this paper to *Musa paradisiaca*, while with ascending leaves behind is the slightly larger *Musa pruinosa*. The occurrence of these Musas is one of the features of these sheltered valleys: and by the course of the Janak stream they were so plentiful that the shelters of the camp at Janakmukh were thatched with them. In the *Memoirs of the Asiatic Society of Bengal*, Vol. V, Plate IV, is a view under Komsing village showing *Musa* in a similar situation.

No one can pass the Musas by without noticing the great size of their leaves: a typical leaf for instance was found to have a superficies of 22,500 sq. cm. Though far larger than any other leaf of the valleys, they are accompanied by other larger leaves of which these are measurements:—

	Sq. cm.
<i>Musa pruinosa</i>	22,500
<i>Brassaiopsis magnifica</i>	5,500
<i>Curculigo recurvata</i>	2,200
<i>Tacca integrifolia</i>	1,950
<i>Rhaphidophora pertusa</i>	1,900
<i>Stuednera capitulata</i>	950
<i>Saurauja punduana</i>	800
<i>Tupistra veratrifolia</i>	800
<i>Ficus Roxburghii</i>	725
<i>Mallotus alba</i>	665
<i>Polypodium iridooides</i>	510
<i>Phlogacanthus curviflorus</i>	500
<i>Psychotria fulva</i>	400

These large-leaved plants are plants of alleyways, stream sides, etc., and do not thrive under great shade. In the great shade the ground plants of these steamy hollows are small leaved, *e.g.* :—

	Sq. cm.
<i>Begonia</i> sp.	180
<i>Smithiella myriantha</i>	90
<i>Chloranthus officinalis</i>	60
<i>Elatostema</i> sp.	40
<i>Peliosanthes violacea</i>	33
<i>Elatostema lineolatum</i>	18
<i>Elatostema khasianum</i>	8
<i>Oplismenus compositus</i>	6
<i>Acrostichum appendiculatum</i>	5
<i>Davallia hirta</i>	7

or again the woody plants present in shade in the same places :—

<i>Cleidion javanicum</i>	180
<i>Myrioneuron nutans</i>	150
<i>Rubus lucens</i> (terminal leaflet)	90
<i>Mastersia assamica</i>	90
<i>Evodia fraxinifolia</i>	75
<i>Rubus lucens</i> (lateral leaflet)	70
<i>Thunbergia coccinea</i>	45
<i>Eugenia aborensis</i>	40
<i>Cinnamomum obtusifolium</i>	38
<i>Smilax lanceæfolia</i>	35
<i>Oxyspora vagans</i>	35
<i>Glycosmis cochinchinensis</i>	35
<i>Calamus</i> sp.	35
<i>Ardisia</i> sp.	35
<i>Gynosporia acuminata</i>	30
<i>Mesua ferrea</i>	20

The leaves of the tall trees still remain small in proportion ; of them these few were measured in a damp sheltered valley bottom :—

	Sq. cm.
<i>Terminalia myriocarpa</i>	280
<i>Cerbera Odollam</i>	160
<i>Quercus</i> sp.	120
<i>Duabanga sonneratioides</i>	105
<i>Trema amboinensis</i>	30
<i>Mezoneuron cucullatum</i> (terminal leaflets)	20
<i>Mezoneuron</i> (lateral leaflet,)	14

Plate V is devoted to the hill-forest at a slightly greater elevation than the damp hollows which *Musa* prefers : V-A was taken upon the south side of the Serpo valley at about 1,800 feet or 549 m., and V-B over the mouth of the Yamne river at about 1,000 feet or 305 m. The opening from which V-A was taken was the Expedition's road : the opening from which V-B

was taken was a new Abor clearing. Abundant climbers are seen in each, including in V-B the sprawling bamboo *Schizostachyum Mannii*. In the middle of V-A is a bare tree, which was never determined, but burst into new leaf in March, a bare tree extremely noticeable on account of its pale bark and conspicuous high leafless branches, standing in forest that otherwise was all but evergreen.

The abundance of climbers in V-A is partially a consequence of the letting in of light by the cutting of the Expedition's road; but V-B shows them present without this artificial aid, the Abor clearing having been newly made. The same big climbers in chief part occur in the lower hill-forests as upon the plain: and *Vitis planicaulis* in the hills serves as the host plant for *Sapria bengalensis*, whose big buds like large Agarics rise from its superficial roots upon the densely shaded soil where nearly bare. *Sapria* is quite common in these forests.

Upon the hillsides *Dysoxylon procerum* and *Styrax Laccii* appear as two of the big trees. *Pandanus* becomes a feature, and so does *Alsophila glauca* near water. Begonias, which are all but absent from the plains become numerous; and with them is got *Balanophora* and also a wealth of Acanths, notably species of the genus *Phlogacanthus*. *Nephrolepis cordifolia* takes on a conspicuousness and in damp spots Selaginellas, *Elatostemas* and Gesnerads are abundant.

Sterculia urens is absent.

Locally species of *Quercus* and *Castanopsis* rule, especially over sandstone rocks.

The temperate forest.

The lower hill-forest passes over into the temperate forest at an arbitrary elevation. In a general way it may be said to be about the altitude where Meliaceæ, Anacardiaceæ, Apocynaceæ, the woody Euphorbiaceæ, *Saurauja*, Eugeniæ and Scitamineæ cease to ascend the hills. As regards Sikkim this is about 5,000 to 6,000 feet or 1,524 to 1,829 m., but in Abor-land is 2,000 feet or 610 m. lower. Upon the south face of Bapu at this height *Michelia punduana* makes a very considerable part of the forest, and again it does the same at the same elevation in places over Rotung. Tree-ferns though not disappearing, become scarce; *Strobilanthes macrostegius* has disappeared, species of *Quercus* and *Castanopsis* become the most abundant of the trees, and mosses wrap the trunks and branches very abundantly. In some places the forest is full of ovate-lanceolate dark-green rather-firm leaves to the exclusion of every other shape except for the fine-cut leaves of *Microlepia hirta* and the softness of the mosses. In other places there is more variety; but never do we get the very large leaves of the steamy hollows.

The overhead oak-trees may be large; and large climbers may run up into them; but there is usually some unevenness which enables the lowest layer

of vegetation to attain more than the height of a man at the expense of the light-diffusion space.

The forest of Terminalia myriocarpa.

Terminalia myriocarpa is one of the largest and most general of the trees of Abor-land at lower levels. Its limit was found to be about 3,800 feet or 1,158 m. An enormous individual tree below Rengging camp had a girth of 12.5 m. It makes pure forest upon the Pleistocene gravels under the hills, which will be described now. These forests are at their climax. Plate II-A is a view into them from the Expedition's road taken in the month of March at the time of leaf-change for this tree.

It is a characteristic of the *Terminalia*-forest that the climbers which may be numerous, fail in general to get into the crowns of the *Terminalias*. Some of this failure may be due to the fall of the watertable in the porous subsoil in relatively dry periods beyond the reach of the climbers; but it is not likely that this is the whole cause, for beside the perennial waters of the Brahmaputra at Kobo *Terminalia*-trees were more free from climbers than their neighbours.

The big climbers, *Mezocurion cucullatum*, *Vitis planicaulis* and *Acacia Intsia* were observed in the *Terminalia*-forest, as well as *Dioscorea Wattii*, *Dioscorea lepharum* and *Thunbergia coccinea*; but not in the same strength as at Kobo. Aroids were rather characteristic, *Alocasia fallax* and *Aglaonema hookerianum* being the commonest; and climbers of this order ascend the tree-trunks high enough to pass through any light-diffusion space. *Miliusa roxburghiana*, *Psychotria* spp., *Leea trifoliata* and *Piper* spp. occurred on the ground, the forest being put together in this way:—

From the soil at		
46 metres.	} individual <i>Terminalias</i> rising above the general vegetation level.	
44		
42		
40		
38		
36		
34		
32		
30		} <i>Terminalia</i> , making alone or with a few large climbers the forest cover.
29		
26		
24		
22		
20		
18		
16		
14	} <i>Chisocheton paniculatum</i> , <i>Bauhinia</i> , <i>Millettia</i> , etc., unevenly.	
12		
10		
8		
6		
4		} aroids climbing on the trunks, <i>Diospyros</i> sp., <i>Polyalthia argentea</i> , <i>Psychotria salocarpa</i> , <i>Coffea bengalensis</i> , <i>Elatostema lineolatum</i> , etc.
2		
0		
0		

Angiopteris evecta is present only by streams ; and *Floscopa scandens* appeared to be absent.

The " Shingkeng " forest.

Shingkeng is the Abor name for *Vatica Shingkeng*—an interesting Dipterocarp, which makes pure forests upon the northern slopes in the outer hills over Siwalik and Gondwana rocks. It is not a tree of great height ; and in no way apparently is the circumstance of its ruling over certain areas to be ascribed to competition for light, but to the soil conditions under which it lives and to some special economy of root. At the edges of the areas where it rules it rapidly disappears from the mixed forest. But undoubtedly the forests of *Vatica Shingkeng* are at their climax.

The shingkeng forest is a very marked association and leaves a peculiarly vivid impression. Under the drip-drip of a typical Abor-land day with a low grey mist overhead the impression is greatest—that of a curious twilight wherein the mind is saturated with the greenness and with the uniformity of the shape of the foliage as well. The trunks are green with a flat lichen, and the shape of the shingkeng leaves overhead is reproduced by not only the shingkeng seedlings underneath, but by the associated shrubs of various orders.

Plate IV-B is of shingkeng forest from an opening due to a fallen tree ; the low plants in the foreground are shingkeng seedlings, and in the background the absence of mosses from the trees is obvious.

Shingkeng forest has no large leaves. These are measurements of typical leaves gathered in an area of pure forest :—

	Sq. cm.
<i>Vatica shingkeng</i>	70
<i>Dalhousia bracteata</i>	140
<i>Psychotria calocarpa</i>	80—100
<i>Polyalthia argentea</i>	65— 90
<i>Phrynium capitatum</i>	90
Undetermined	80
<i>Pollia</i> sp.	75
<i>Gymnosporia</i>	75
Undetermined	70
<i>Diospyros</i> sp.	60
<i>Clinacanthus</i> sp.	55
<i>Ardisia</i> sp.	50
<i>Apocynacea</i>	45
<i>Microtropis discolor</i>	40
Undetermined	40

Popowia Hookeri, *Polyalthia argentea*, *Polypodium hemionitideum*, *Psychotria denticulata*, *Polybotrya appendiculata*, *Gutteria pallida* and *Peliosanthes*

violacea are very common companions of the shingkeng. These make an assemblage which certainly has smaller foliage than assemblages to be found at the same altitude upon other and neighbouring hill-faces.

On March 2nd at Rengging I made an observation upon the reduction of the light under shingkeng trees and found it $1/29$ to $1/42$ of the light within Rengging camp and on the Expedition's road in the neighbourhood of the camp.

The bamboo belts.

The village of Balek takes its name from its bamboos, but they are cultivated. Similarly there are groves of cultivated bamboos near other villages. Wild however are the belts of bamboos which girdle the hills on very steep slopes. Plate II-B is a view in one of these belts showing how the bamboos fall across each other. The consequence of this falling is the blocking of the Abors' hunting paths, so that they invariably get broken at the belts.

There are very few plants associated with the bamboos. One of the few is *Psychotria denticulata*; another a *Pteris*. Bamboo thickets elsewhere than in Abor-land are equally devoid of associated plants; but I have seen hillsides in Cachar after the flowering and death of *Melocannas*, become green from a growth of climbers, either from dormant seeds, or from suppressed small plants which obtained and utilised their chance of growing when the shade of the *Melocanna* was removed.

Rocky ridges.

A few rocky ridges cross Abor-land. The best known of them was called by the Expedition the "Razor-edge" from its sharpness, and lies between the Igar and Lalik streams. It seems that a hard quartzite makes it. There is another such ridge upon the mountain overshadowing Rengging camp, and a small one over Rotung apparently geologically the same; while upon Bapu is a rocky ridge perhaps of a different nature, and the summit presents a sandstone cliff towards the south which therefore affords a position for plants as well drained as the other rocky ridges.

These ridges are deficient in humus and carry a vegetation consequently modified.

On the Razor-edge occurred *Dipteris Wallichii* and *Brachytome Wallichii*.

The summit over Rengging camp is more fully exposed and much higher. The rocks are coated by orchids elsewhere epiphytic, none of which were in flower at the time of my two visits. Two species of *Agapetes* were with them. *Rhododendron calophyllum* occupied the most exposed corner. Growing up to the rocks from below over and among laurels as *Lindera pulcherrima*, were

Arundinaria Mannii, *Calamus acanthospathus*, *Calamus gracilis*, *Pandanus* sp. and *Smilax parvifolia*. *Cyclophorus irrigua*, *Carex cruciata*, *Ophiopogon wallichianus*, *Microtropis* sp., and *Daphne involucrata* were present between the rocks and the forest. *Lasianthus Biermannii* and an *Ardisia* were in the edge of the forest along with *Castanopsis Clarkei* carrying the same orchids apparently as the bared rock, and *Pieris ovalifolia*. Not remote was *Peperomia reflexa* and the very peculiar *Elatostema imbricans*.

The rocky ridge on the ascent of Bapu carried a *Vaccinium* growing 2m. high over rocks, *Peperomia reflexa*, *Viola serpens* in great abundance, abundant *Cryptocarya Andersonii*, a *Hydrangea*, plenty of *Plectranthus Griffithii*, *Senecio araneosus*, *Rubus lineatus* and *R. Burkilli*, *Rubia sikkimensis*, *Carex filicina*, *Panicum plicatum*, *Ichnanthus pallens*, and *Pteridium aquilinum*, an assemblage quite different from that of the hill-top over Rengging.

Upon the very summit of Bapu *Damnacanthus indicus* was found along with *Daphne Wallichii*, *Lasianthus Biermannii*, *Symplocos glomerata*, *Rhododendron calophyllum*, a *Vaccinium*, a *Strobilanthes*, *Arundinaria Griffithiana*, *Ainsliea pteropoda*, *Euonymus frigidus*, *Polygonatum oppositifolium*, *Smilacina fusca*, *Peliosanthes macrophylla*, all under the shade of trees of *Quercus dealbata*, *Quercus* sp. (this being the chief tree), *Pieris ovalifolia*, *Garcinia Morella* and some other species. The trees carried epiphytes as *Peperomia reflexa*, *Medinilla himalayana*, *Aeschynanthus* sp., *Rhaphidophora grandis*, *Polypodium normale*, *Hymenophyllum badium*, *Heptaplcurum* sp, mosses and many orchids, which were flowerless. Further over the trees climbed *Calamus acanthospathus*.

The clearing of the top for trigonometrical observations was leading to a very vigorous growth of the *Strobilanthes*.

Bracken or Pteridium Aquilinum.

It was a long time before I found this extraordinarily widely distributed fern in Abor-land, where it is very rare: before leaving the hills, however, I had found five localities, all more or less in a line from north to south. The northernmost place was near Ponging village towards Jaru, the second under Ponging upon the bank of the Dihang, the third was over the junction of the Yamne with the Dihang, the fourth immediately over Rengging camp, and the last the rocky ridge upon the south face of Bapu which has just been described. In each locality it is exposed: my diary records of the Ponging locality "bracken occurs sparingly under *Saccharum*. . . on a bluff at the actual corner of the Yamne valley: the corner is exposed and a strong wind was blowing over it." The other localities were similar in exposure, except that by the river side. In one of them it had *Gleichenia* and *Eurya* for associates; in

another it had *Lycopodium cernuum*. Near Ponging a solitary tree of *Bombax* was near to it, one of the two observed furthest in the hills.

Nowhere was the Bracken abundant; and the largest clumps carried but 15 fronds.

Phegopteris punctata which has the habit of *Pteridium* was observed elsewhere in the hills.

Epiphytes.

Epiphytes and rock-plants have this in common, that they run alike risks of desiccation: it is convenient therefore to proceed to epiphytes.

The excessive moisture of Abor-land favours epiphytes, which are even more numerous than the enumeration following (Part XI) indicates. Mosses are in great abundance, both upon bark, stones, and earth, and also on leaves. *Neckeropsis crinita* was found upon a thalloid liverwort. Ferns are common, especially *Asplenium Nidus*. Unusual plants were found existing as epiphytes, e.g. *Adenosacme longifolia* and *Polygonum chinense*.

Epiphytes in the plains, are most common upon the northern sides of tree-trunks; but a little more shade than is usual will enable them to live on the south side also.

The basin of stiff leaves which *Asplenium Nidus* possesses would seem likely to be an excellent place for other epiphytes to use in commencing life, especially as many seeds must fall into it, and on account of that a considerable amount of attention was given to it. But the conclusion was reached that it is far too dry * in most case for such a purpose: and the total number of instances of other plant serving themselves at the cost of this fern is summed up in the following table:—

- Ficus elastica, whose seedlings store water in a swollen hypocotyl, once
- Boehmeria platyphylla, two seedlings dying from want of water at a height of five cm.,
- Anonacea, seedling,
- Maesa indica, seedling,
- Polygonum Posumbu,
- Jasminum seedling,
- Conocephalus suaveolens,
- Asplenium nitidum,
- Polypodium nummularifolium,
- Nephrolepis cordifolia, and
- Psilotum triquetrum.

Inasmuch as *Boehmeria*, *Maesa indica*, and *Anonaceae*, as well as *Polygonum Posumbu* do not exist as epiphytes, we may assume that their seedlings were destined to fail in the *Asplenium Nidus* basins. The ferns would succeed ; but it is an interesting thing that *Asplenium Nidus* spores appear not to germinate in the plant's basins.

In one case a *Vitis* touching an *Asplenium* had rooted adventitiously among the *Asplenium* roots ; and in another an *Aeschynanthus* had done the same.

It is well-known by those who cultivate orchids in the tropics that they show marked preferences for certain trees. The reasons for the preferences are complicated differing from place to place (*cf.* Hope on varying requirements of a few in Journal of the Bombay Natural History Society, XV., p. 89; and difficult to analyse ; but whereas some trees give excessive shade ; and others produce too damp an atmosphere, the surface of the bark is undoubtedly of great importance. Clearly it is possible that a tree may afford a suitable substratum in one country, but be unsuitable in another. The following trees in Abor-land bore epiphytic Spermatophytes or Pteridophytes :—

Altingia excelsa, *Artocarpus integrifolia* (but rarely), *Bassia butyracoides*, *Bischofia javanica*, *Caryota urens*, *Castanopsis Clarkei*, *Cedrela febrifuga*, *Duabanga sonneratioides*, *Dysoxylon procerum*, *Eugenia* sp., *Gleditschia Delavayi*, *Hovenia dulcis*, *Pterospermum acerifolium*, *Quercus* sp., *Spondias axillaris*, *Stereospermum chelonoides*, *Terminalia myriocarpa*, *Trema amboinensis*, and *Ulmus lancifolia*.

The Abor clearings .

The Abors fell and burn, as far as burning is easy : then they sow among the prostrate logs, and that which comes up, the mixed crop and the weeds in it is allowed to grow without any weeding. Compositæ are the most prominent of the early weeds, especially *Ageratum* and various species of *Blumea*. These come up through the standing grain ; and under them may be found lesser weeds such as *Viola Patrinii*, *Viola diffusa*, *Oxalis corniculata*, *Mazus surculosus*, *Drymaria cordata* and *Ajuga macrosperma*. Seemingly, a little later in asserting themselves, appear *Spilanthes Acmella*, *Gnaphalium luteo-album*, *Calamintha gracilis*, *Triumfetta Bartramia* and *Triumfetta pilosa*.

As the climate of Abor-land shows distinct seasons (*vide* the diagram on p. 9), the clearings of the Abors return to forest by annual waves ; and the stages of returning which we call seres, will be found most easily defined by the age of the clearing. The sere which comes earliest has a duration of one year or less because it contains the annual weeds. The weeds of this first sere are small-leaved. Gathering, from a clearing in it in the immediate

neighbourhood of Rotung village, a typical collection of leaves and measuring them, I obtained the following figures :—

	Sq. cm.
<i>Plantago major</i>	25
<i>Ajuga macrosperma</i>	25
<i>Dichrocephala latifolia</i>	15
<i>Ageratum conyzoides</i>	13
<i>Bidens pilosa</i> , (terminal leaflet)	9
<i>Hydrocotyle rotundifolia</i>	8
<i>Viola Patrinii</i>	7
<i>Bidens pilosa</i> , (lateral leaflet)	6
<i>Polygonum Posumbu</i>	5
<i>Polygonum capitatum</i>	4
<i>Impatiens violæflora</i>	4
<i>Andropogon assimilis</i>	4
<i>Viola diffusa</i>	3
<i>Lobelia affinis</i>	3
<i>Gnaphalium luteo-album</i>	3
<i>Drymaria cordata</i>	2
<i>Oxalis corniculata</i>	0.5

With the intrusion of woody plants, which becomes evident only after the reaping of the first crop, the superficies of the leaves in the clearing increases ; and after a few years a sere exists such as the following represents :—

	Sq. cm.
<i>Psychotria denticulata</i>	300
<i>Dalhousia bracteata</i>	210
<i>Combretum dasystachyum</i>	200
<i>Blumea balsamifera</i>	135
<i>Stemona tuberosa</i>	125
<i>Girardinia heterophylla</i>	125
<i>Solanum indicum</i>	110
<i>Natsiatum herpeticum</i>	110
<i>Bauhinia divergens</i>	110
<i>Rubus Burkilli</i>	100
<i>Casearia Vareca</i>	90
<i>Melastomad</i>	75
<i>Cinnamomum obtusifolium</i>	75
<i>Meliosma pinnata</i>	65
<i>Boehmeria platyphylla</i>	60
<i>Litsea salicifolia</i>	50
<i>Pilea smilacifolia</i>	40
<i>Piper sp.</i>	35
<i>Cissampelos Pareira</i>	30
<i>Melodorum bicolor</i>	28
<i>Cudrania javensis</i>	20
<i>Hedyotis hispida</i>	15
<i>Clematis gauriana</i>	13
<i>Rubus lasiocarpus</i>	6

These plants were all in association close to Rotung village, upon clearings returning to jungle at a slightly earlier stage or sere than those seen in Plate VI-B. After the sere has passed, considerable divergence may arise in different clearings. Upon some *Macaranga denticulata* becomes predominant; upon others *Saurauja punduana*: some grow grasses and some grow none; under the hills upon the pleistocene gravels *Phragmites* comes to rule; on clearings from Yambung northwards *Saccharum* plumes make a show: the big clearing of Rammidambang appears to owe its name to the abundance of *Blumea* on it. I had not time to get a full knowledge of the courses of the recovery of the forest; but these appear reasonable conclusions:—that *Saurauja* is likely to get the upper hand if the situation be very moist and at some slight elevation; and in these places *Selaginella* may coat the ground under the *Saurauja*-bushes; that *Macaranga* very often gets the upper hand in lowland steamy hollows; that *Saccharum* gets the upper hand only away from the edge of the hills where some of the excessive moisture has been lost from the wind.

The *Saccharum*-with-*Eurya* clearing upon Signal Hill over Yambung deserves a few words. The soil was found to be full of angular lumps of quartzite, most unpleasant to walk over. The vegetation was mainly of *Saccharum arundinaceum*, *Phragmites Karka* and *Themeda gigantea* with *Eurya* bushes intermixed: on the steepest slopes the last grass was the most abundant; at 1,500 ft. or 457 m. the second grass rules; then the formation gave place to *Phrynium capitatum* and *Saurauja* which had clothed the actual summit, the sedges *Carex flicina* and *Scleria elata* taking the place of grasses. As there were neither *Bombax malabaricum* nor *Zizyphus Jujuba* bushes on the hill the formation bore only such little resemblance to the vegetation of grassy places in the plains as was due to the coarse grass and to the scitamineous leaves in it.

The forest wall towards the river on firm ground.

Where a river cuts through the forest, the light so let in under the big trees fosters a modified flora. The commonest tree in such situations is *Ficus Cunia*, its branches arching out into the light and its leaves making a beautiful mosaic. Along with it grows *Leea aspera*, *Saurauja nepalensis*, *Macaranga denticulata*, *Cudrania javanensis* *Grewia laevigata*, *Boehmeria macrophylla*, and the grasses *Thysanolaena maxima* and *Imperata arundinacea*. Of these plants *Leea aspera* is most commonly seen on corners, arching out, and it goes bare when the river is low.

Strobilanthes macrostegius (Plate III-A) may occur in the wall under the shade of *Ficus Cunia*: and *Bauhinia purpurea* may be present.

The situation is moist, and the leaves of the characteristic plants are relatively large, *e. g.*

	Sq. cm
<i>Ficus Cunia</i>	490
<i>Saurauja punduana</i>	800

as their neighbours the Musas and the associates of *Musa* in the sheltered hollows. As the situation is permanent, the vegetation must be regarded as a climax.

The plants which invade the river-bed.

Plate IX-B shows the Dihang in its defile under Rotung village at the season of lowest water. The exposed bank above the stream at this season is fifty feet or 15 metres high but over it in the rains the river rises into the edge of the forest covering these banks, rushing over the rocks with a fierce current and forbidding any but specially suited terrestrial vegetation to exist upon them. As for the most part the river remains full from June until October comes to an end, the time when these specially suited plants can vegetate freely is at the most seven months and during those seven months at the upper edge of the banks a few short lived proletarians join them. The perennials which endure the five months of submergence, and withstand the furious current are exceedingly interesting. Again, as the condition is permanent. this vegetation has the nature of a climax, though a very open association, but the admixture of short lived plants is the admixture of an imperfect sere.

At Rotung the gorge is more hemmed in than below and than above, so that the stream is most furious there ; but everywhere at the height of the river it is very powerful.

The following are the proletarians (belonging to an imperfect sere) which were observed in the river bed just below the upper flood limit:—

Blumea membranacea, *Crepis japonica*, *Lactuca gracilis*, *Vernonia cinerea*,
Oxalis corniculata, *Fragaria indica*, *Viola Patrinii*, *Mazus surculosus*,
and *Phyllanthus* sp.

The following are the species of the peculiar climax with special adaptations to the locality, in tabular form showing the zone of the river bed that they occupy :—

<i>Ficus heterophylla.</i>	□
<i>Arundinella intricata.</i>	□
<i>Rhabdia lycioides.</i>	□
<i>Marchantia</i> spp.	□
<i>Homonoia riparia.</i>	□
<i>Carex Thomsopi.</i>	□
<i>Pteris Griffithii.</i>	□
<i>Nephrodium extensum.</i>	□
<i>Ficus pyriformis.</i>	□
<i>Asplenium esculentum.</i>	□
<i>Polygonum chinense.</i>	□
<i>Equisetum debile.</i>	□
<i>Polypodium proliferum.</i>	□
<i>Jungermannia</i> sp.	□
<i>Fissidens diversifolius.</i>	□

Phragmites Karka also occurred in the river bed, a plant here and a plant there evidently washed from the bank during the later part of the time of high-water, and deposited as the river fell; but in its case it was possible from remains to see that it would not survive the next flood-season; and for that reason it has been excluded from the table above. *Polygonum chinense* was almost excluded from the table on revision, but the way in which it grew sterile but apparently healthy when comparatively newly uncovered, caused it to be allowed a place: its mode of persisting should be the subject of study.

Fissidens diversifolius, the moss which descends furthest into the river bed, is obviously fitted for its amphibious existence: and it produced capsules within a very short time of being uncovered. Its favourite habitat is the surface of dead *Homonoia*-twigs close to the shingle of the bed. At Janakmukh it was found almost 2 metres lower than the next species,—the two undetermined *Jungermannias*, which were sterile. About a metre higher at Janakmukh appear *Phegopteris prolifera* and *Equisetum debile* together, with a few plants of *Polygonum chinense*. All of these plants were sterile at the lower levels. A little higher *Diplazium esculentum* and *Ficus pyriformis* appeared, sterile too, and the stem-tips of the latter killed. It would seem rather to be a case of endurance of adverse conditions than adaptation to submergence in all species so far mentioned except the *Fissidens*; for all seem to grow with more success above the flood-limit: but among the next plants are species specially adapted which do not occur above the flood-limit as *Pteris Griffithii*, *Homonoia riparia* and *Carex Thomsoni*. Along with them occurred *Diplazium esculentum* which has not special adaptations. The two ferns occupy sheltered corners among boulders and in bays; but the two Spermatophytes were found in places where the current would run fiercely. All of these remained sterile until the very end of January, by which time they had been uncovered for a couple of months and perhaps more.

Of the four remaining species, *Arundinaria intricata* and *Rhabdia lycioides* are specialised plants; *Marchantia* is not specialised, and *Ficus heterophylla* is a stream-side species.

The depth to which the species enumerated advance into the river-bed was worked out in chief part at Janakmukh, and corrected by observations along the river at all other points touched.

Plate X is given over in this paper to the illustration of *Homonoia*: A is the bed of *Homonoia* at Kobo in general view showing how the stream causes a permanent lean in the twigs: B is a bulky trunk exposed by erosion.

When the river falls and exposes the *Homonoia* bed, the twigs are leafless, but the bark contains chlorophyll. Then in December copper-coloured leaves are put forth and at the end of February flowers commence to appear, the first being close to the shingle or sand where they receive a considerable amount of heat. The seeds germinated in January, producing an erect seed-

ling, which it seems is pushed over to a leaning position in the first flood-season.

Among the *Homonoia* plants *Carex Thomsoni* finds a suitable place. When the waters fall from above it, its leaves are green and towards the down-stream side of most of the plants prone against the soil lies the infructescence of the last season still holding its seeds. When these seeds are bared they germinate; and a brush of rootlets descends out of the infructescence to the river-bed, which as the *Carex* plants hold a small amount of debris, is almost always a spot prepared for them.

How these two plants can spread up-stream is not evident. Their spread down-stream towards Dibrugarh is soon stopped by the absence of suitable shingle-beds for their growth.

Homonoia often gets killed by burial in a sand-drift; and what is the case with it, is doubtless also the case with the other plants of the river-bed.

Among the *Homonoia*, *Equisetum debile* makes sterile felted patches by a sexual reproduction. In the same places *Phegopteris prolifera* "walks" by the production at each leaf-tip of a new plant, it thus ties itself down against being torn from its root-hold. *Polygonum chinense* roots at its nodes and so gets anchorage.

Rhabdia lyciodes is in appearance rather like the *Homonoia* and is made by the current to lean in the same way. When driven to be quite prostrate, it produces adventitious roots, and so in the fierce current takes the firmer hold. Its new foliage is produced contemporaneously with that of *Homonoia*, but is not bronzed. The bark is thick and green.

Arundinella intricata grows on rocks and holds tight to them by the web of roots from which it gets its specific name. These form a dense mat of remarkable firmness.

Along the river-margin are a few more plants which have not been named yet: these are *Coriaria nepalensis*, and *Spiradichis cylindrica*, which are specialised river-margin plants; and with them may be found *Carex filicina*, *Pogonatherum saccharoideum*, *Arundinella Wallichii*, *Elaeagnus pyriformis*, *Grewia serrulata*, *Ardisia depressa* and *Ophioglossum vulgare*.

The average leaf of *Homonoia* measures 23 sq. cm. which is not large; and the foliage of its associates in the river bed are distinctly small—

	Sq. cm.
<i>Ficus pyriformis</i>	23
<i>Homonoia riparia</i>	23
<i>Grewia serrulata</i>	9
<i>Urena lobata</i>	1.5
<i>Rhabdia lysioides</i>	1.5
<i>Polygonum capitatum</i>	1
<i>Pogonatherum saccharoideum</i>	1

Homonoia. requires considerable moisture and is apt to grow most luxuriantly where small streams entering the river filter through the gravel.

“*Chapris*” or sandbanks re clothed by herbage.

The word chapri is a local one and indicates a patch of grassy sward lying in the forest. A chapri always commences as a sandbank or succession of sandbanks. Small more or less drought-resistant herbage takes possession as the first sere and until this has been ousted by trees the word chapri is applied. Two rather large chapris came under observation during the Expedition and some smaller ones. The largest lies immediately north of Kobo, and has resulted from a gradual shifting eastwards of the Lalli branch of the Dihang, which at one time entered the Brahmaputra at Pobomukh. This chapri has been subject to frequent firing and its area has probably been retained as much greater than otherwise it would have remained, the firing killing the marginal forest and the invading trees. The chapri second in size lies near Pilung and is narrow: it escapes frequent firing, carries coarser grass than the Kobo or Kemi chapri, and is being closed by the invading forest. In the lesser chapris their very smallness keeps their surface moist and they have not got the pronounced features of the larger areas. Of all the vegetation in Abor-land, none is more xerophytic except the epiphytes, than the vegetation of the Kobo or Kemi chapri. Plate VIII-B is of the western edge of the chapri in March; and plate VIII-A of the western edge of the Pilung chapri in the same month. Both views show deciduous trees,—in B of *Sterculia urens*, or in A of *Bombax malabaricum* and of a *Dalbergia*. The presence of deciduous trees is a feature of the edge of a chapri and especially of the western edge which receives the first sunshine of the day. They constitute a sere as they later give way to the normal climax. It is to be noted that it is the tall trees of this sere which are deciduous, and that the middle layer of the forest is full of evergreen trees. In front, as far as firing permits, advance the same deciduous trees as form the border: they advance the more effectively along the eastern edge and southern edge, because there the dew lies longest by reason of the shadow that the forest margin casts, and a fire, especially a fire started before noon, advances to the very edge with less ease. On the southern edge of the Kobo chapri the advance into the open of *Bombax malabaricum* was especially noticeable. Why this tree is absent from the view B I am not prepared to say; but it occurred at no great distance from the spot.

Out in the open parts of the chapri the following woody plants are found: *Zizyphus jujuba*, *Leea crispa*, and *Grewia nana*: additional upon the Pilung chapri were *Elaeagnus pyriformis*, *Eugenia* sp. and an interesting *Phyllanthus*. The *Grewia* has an underground stem which escapes injury in the firing; and

the *Leea* escapes by losing all its above-ground parts at the close of the rainy season. Thus they are plants of special adaptation to their habitat.

Of herbs upon the chapri, *Imperata arundinacea* is that which makes the greater part of the vegetation: it is joined by *Cyperus niveus*, *Fimbristylis junciformis*, a *Desmodium* probably *D. laxiflorum*, *Pachystoma senile*, *Conyza japonica*, *Aneilema nudiflorum* and *Phegopteris prolifera*. Into the more lush grass of the Pilung chapri, *Alpinia allughas* and another *Scitaminea* had found entry plentifully: and upon a small chapri near Pobamukh *Triumfetta cana* almost prevailed.

Out of the herbs, the orchid *Pachystoma senile* shows a suitability to its place, for it flowers leafless in the dryer weather and only when the time of firing is over produces its long solitary leaf.

Wind-dispersal is the rule among the plants of the chapri: and *Salix tetrasperma*, which grows upon the river margin among the chapri is like the plants of the chapri wind-distributed.

The lesser trees of the forest wall at the edge of the Kobo chapri had among them, *Meliosma simplicifolia*, *Meliosma pinnata*, *Viburnum colebrookianum* and a *Mallotus*; while the climbers were *Mezoneuron cucullatum* and *Acacia Intsia*.

The grass land of Sadiya.

It is very probable that a part of the grass-land about Sadiya began as a chapri; indeed it is inconceivable that much did not; but the majority of the wide grass area there has been greatly modified by grazing and by cultivation. The most grazed parts carry *Cassia Tora*, *Artemisia vulgaris*, *Pardanthus chinensis*, *Mosla dianthera*, *Plectranthus ternifolius* and *Urena lobata*, plants which are not touched by the cattle and get advantages over their competitors thereby. It is probable that except the *Cassia* they would be destroyed if the area were regularly fired. Grazing is greatest near the village; go a little distance away and the grass which in the wet months close to Sadiya attains a metre in height, attains two metres high, with locally in it *Lactuca brevirstris*, *Leea crispa* and *Zizyphus jujuba*. At the end of the rains *Cassia Tora** dies and the *Leea* disjoins itself and in a short time the places where it is abundant are completely changed in appearance. Further away still *Saccharum arundinaceum* comes in and attains 6 metres in height, and it is associated with small trees of *Rhus semialata*, *Gardenia campanulata*, *Ficus sylhetensis*, *Rhamnus nepalensis* and *Vangueria spinosa*.

Dotted about the open near Sadiya are little fields, which have been abandoned. It is very interesting to observe how they become covered with

* It is of passing interest to note that Gammie (Records of Botanical Survey of India, I, p. 71) does not name *Cassia Tora* as a Sadiya plant; for at the time of his visit there would be none upon the ground: nor does he mention *Leea crispa* which in the rains is so obvious.

Ourcumas, and *Colocasia Esculentum*. *Viola Patrinii* is also an abundant plant if the herbage be short.

Periodicity in the vegetative activity.

Besides *Bombax malabaricum*, *Sterculia urens* and the *Dalbergia* which have been mentioned as deciduous trees upon the edge of the chapris, and besides *Leea crispa* which casts away all its above-ground parts in the same places, and *Leea aspera* which has been mentioned as deciduous on bluffs upon the river margin, and also besides the naked tree which has been named as standing bare in the hill-forest, the following deciduous trees exist in Abor-land:—*Spondias axillaris*, *Chikrassia tabularis*, *Cedrela longifolia*, *Erythrina stricta*, *Trema amboinensis*, *Hovenia dulcis* and *Populus ciliata*, and of smaller woody plants *Rhus Griffithii*, *Aralia foliosa* and *Coffea bengalensis*. The last is only just deciduous.

There are more deciduous trees on the edge of the hills than within them; and within the hills they are more easily found on bluffs and exposed places low down than in the evergreen hill-forest.

Climbers which die to the ground are to be classed with deciduous plants; and among such are *Dioscorea pentaphylla*, *Dioscorea lepcharum* and all the other species of the genus except *D. Wattii* which is never out of leaf, *Mucuna* and species of *Argyreia*. The woody climbers are for the most part, if not completely, evergreen.

During the part of the year over which the Expedition extended, the following seasonal changes were noted:—about the end of the year when some of the trees were commencing to be bare, the climbers *Stemona tuberosa*, *Brachystemma calycinum*, *Vitis planicaulis* and *Jasminum flexile* entered upon vigorous growth: further some of the trees of the middle layer of the forest put on new foliage, e.g. *Aesculus indica*, *Millettia pachycarpa* and *Meliosma simplicifolia*, the last with its new foliage red. A month later leaf-change was in progress upon several species of *Quercus*, *Altingia excelsa*, *Bassia butyracoides* and *Knema*; and at the same time *Garcinia stipulata* put out new red leaves; In March the foliage of *Terminalia myriocarpa* became thin and the trees changed leaf; *Ficus nemoralis* changed leaf at the same time.

Open places upon the mountains.

There are no naturally open places upon the outer Himalaya of Abor-land that are not due to swampiness; but of swamps there are a few, the largest swamp being Ripshing-sieng upon the north side of Bapu. I visited it in March and I had visited earlier some smaller swamps nearer to Rotung, but all towards the hill-tops. In March I could walk over almost the whole of the spongy

surface of Ripshing-sieng : but one of the other swamps visited could not be crossed.

The surface of Ripshing-sieng is coated in chief part by *Carex rara*. With it occurs a small yellow *Ranunculus*, just at flowering on March 8th, a *Pimpinella*, not then at flowering, a little of *Carex myosurus* and two grasses, which were flowerless and are indeterminable, *Hypericum nepalense*, *Chrysosplenium nepalense* and *Lysimachia japonica*, the last rather rare. Upon the very edge was *Embelia parviflora*, a *Vaccinium*, *Litsea citrata*, *Panax Leschenaultii*, and (as epiphytes) *Asplenium Nidus* and *Polypodium Lehmanni*.

In the very wet swamp nearer to Rotung occurred the same *Ranunculus*, *Chrysosplenium nepalense*, *Fimbristylis junciformis* and *Ceratophyllum demersum*, which last points to the permanence of the water which it held.

In a smaller wet depression where the trees met overhead there was a Gesnerad, a *Begonia* and an *Elatostema* sparingly upon black greasy mud. It may be assumed that the want of sunlight had rendered impossible the growth of the species enumerated as occurring in the other swamps.

Grasses upon path sides.

The evergreen forest is inimical to grasses except bamboo and though man's interference helps them, they are upon the whole rare in Abor-land. However, close to the more populous villages, upon very much frequented pathsides a border of sward appears. One such place was close to Babuk village and the grasses were *Paspalum conjugatum*, *Eragrostis amabilis* and *Sporobolus indicus*. Near to the village of Pangî a similar sward was observed. There was a tiny sward near the village of Balek made of *Oplismenus compositus* and *Paspalum conjugatum*. Lastly upon the Dihang bank between the villages of Kebang and Pangî where the villagers ferry across, was a grassy patch composed of *Imperata arundinacea*, *Cynodon dactylon*, *Paspalum conjugatum*, *Kyllingia brevifolia*, *Cyperus elegans* and in it *Buddleia candida*. This patch was much eaten down by mithan.

The usual path-side vegetation.

The paths among the clearings elsewhere were not bordered by grasses, but by a variety of small-leaved weeds, such as those enumerated in the list of early plants upon the clearings. These paths to the clearings are not exactly permanent.

The variety of foliage in the floor of the forest.

Exposed areas are not those with the most unusual forms of leaves, but the depth of the evergreen forest holds them in greater richness. Want of symmetry is one way in which this is shown : in the deep Abor-land forests there are *Begonias*, *Elatostemas* and many similarly unusually shaped plants.

Strobilanthes glomeratus, *Rhynchotechum ellipticum*, *Globba multiflora*, *Rhaphidophora Hookeri* and *Doritis Wightii* have asymmetrical leaves; and the species which have compound leaves with asymmetrical leaflets after the manner of the ferns, palms as *Pinanga* and aroids as *Amorphophallus*, are numerous.

Then again the ground foliage exhibits variegations such as the lilac spots upon the species of *Piper* near *P. porphyrophylla*, the white markings upon a *Strobilanthes* near *S. dyerianus*, the black spots of *Begonia Burkilli*, the silver spots of *Begonia scintillans*, the silver radiating overlapping spots of *Begonia iridescens*, the zones of silver in *B. laciniata* and *B. Rex* and the milky markings of the leaf of *Acanthus leucostachyus*. These colour variegations are the property of the evergreen Rain-forest, it seems.

Shade plants without shade.

Upon the north side of Rotung village where the hillside falls into the gorge of the Dihang exceedingly steeply, shade-plants grew without overhead shade, the north exposure protecting them sufficiently. Parts of this hillside got no direct sunlight in December.

Vivipary of the ferns.

The "walking" of *Phegopteris prolifera* in the river bed has been mentioned already. *Asplenium achilleifolium* walks in just the same way about the bases of the forest-trees; and at the end of the Rains every frond of *Aspidium vastum* carried two viviparously produced plantlets on its back. These ferns were observed to be abundant.

Pollination.

Insect aid in flower-fertilisation appeared small during the period of the Expedition. *Apis dorsata* was observed at Kobo upon the flowers of *Strobilanthes aborensis* (not *S. Mastersii* as stated in Journal As. Society, Bengal, XII, 1916, p. 253) in November and early December, and on those of *Mezocnuron cucullatum* in December, and again in early March upon the flowers of *Polygonum capitatum*: but it was not observed flower-visiting in the hills until March had come in. It was not dormant, for a swarm was observed north of Ponging on January 22nd; it seemed to be rather rare. *Bombus* was observed in the hills on January 22nd, the same date, at Rotung; but no bumble-bees were seen on flowers until March 8th, when a single one was observed upon an *Ophiorrhiza*. *Xylocopa* was not seen at all in the hills; but it certainly occurs at their foot. As it is dormant for a short period as far south as Calcutta, it was probably dormant during much of the period of the Expedition in the higher latitude of Upper Assam. Butterflies and Bibionid flies were seen upon flowers about Kobo in February and March.

PART III.

Table 1.—A list of the Spermatophyta collected wild, their Zones in Abor-land, their altitudes in feet and for comparison the altitudes from which they are recorded in the Sikkim Himalaya; and in the last column an indication of their distribution.

In this list the names of the plants are in three types; small roman for those which do not descend on to the plains of Assam; small capitals for those which pass out on to the plains to say 20 miles from the skirts of the mountains; and large capitals for those which pass out into the centre of the Gangetic plains.

	ABOR-LAND.				Sikkim.	Distribution.	
	Zones.			Height.			
OLEMATIS GOURIANA	..	..	..	4	900—1,800	—2,000	Indo-malayan.
„ sikkimensis	..	..	..	4	1,800—3,800	5,000—7,000	Assamese.
„ sp.	..	..	3	..	2,000	..	..
NARAVELIA ZEYLANICA	1	..	..	..	plains	Terai	Indo-malayan.
Ranunculus sp.	..	..	3	4	5,500	..	..
DILLENIA INDICA	1	2	3	..	plains—700	..	Indo-malayan.
TALAUMA HODGSONI	1	2	..	4	plains—2,000	1,000—6,000	Assamo-burmese.
MICHELIA GRIFFITHII	1	..	..	..	plains	..	Endemic.
„ OBLONGA	..	..	2	..	plains	..	Assamese.
„ punduana	..	..	3	4	3,500—5,000	..	Assamese.
KADSURA ROXBURGHIANA	1	..	3	..	plains—700	Terai—8,000	Assamese.
DESMOS CHINENSIS	..	..	..	4	1,300	Terai—3,000	Indo-malayan.
Dasyaschalon longiflorum	..	..	..	5	3,900	..	Assamo-malayan.
Popowia Hookeri	..	2	3	4	500—4,500	..	Assamese.
OXYMITRA FORNICATA ?	..	..	..	4	900	..	Assamo-burmese.
Melodorum bicolor	..	..	..	4	(plains)—2,000	Terai—1,000	Assamo-burmese.
„ polyanthum	..	..	3	4	(plains)—1,800	..	Assamo-burmese.
MILUSA ROXBURGHIANA	1	2	3	..	plains—3,800	Terai—4,000	Assamo-burmese.
„ dolichanthera	..	..	3	4	900—1,300	..	Endemic.
„ sp.	..	..	3	..	700—3,200	..	..
ASPIDOCARYA UVIFERA	..	..	3	4	1,400—1,800	1,000—5,000	Assamo-burmese.
„ sp.	..	..	..	4	1,300	..	Endemic.
TINOSPORA MASTERSII	1	..	..	..	plains	..	Assamese.
„ CORDIFOLIA	1	..	..	4	plains—1,300	..	Indo-burmese.
TINOMISCIUM PETIOLARE	1	..	..	..	plains	..	Assamese.
DIPLOCLISIA GLAUDESCENS	..	..	3	..	2,000	..	Indo-assamese.
PERICAMPYLUS GLAUCUS	1	..	..	..	plains	900—3,700	Assamo-malayan.
„ ADUNCUS	1	..	..	..	plains	—1,500	Endemic.
STEPHANIA HERNANDIFOLIA	1	2	3	..	plains—700	Terai	Old World.
„ ELEGANS	1	..	..	..	plains	1,800—4,600	Himalayo-assamese.
„ GLABRA	1	2	3	..	plains	Terai—5,000	Indo-burmese.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.	Height.				
CISSAMPELOS PAR-EIRA	1	3	4	plains—1,500	Terai—1,600	Assamese.
" sp.		3	4	700—1,500	..	† Endemic.
Pycnarrhena planiflora	2	..	..	plains . . . . .	..	Assamo-chinese.
Cyclea bicristata	3	..	..	1,400	1,000—2,500	Assamese.
STAUNTONIA BRUNONIANA	1	..	..	plains . . . . .	..	Assamo-burmese.
NYMPHAEA STELLATA	1	..	..	plains . . . . .	..	Old World.
Dicentra scandens	2	3	4	4,600	2,000—10,000	Himalayo-assamese.
NASTURTIUM INDI-CUM	1	..	..	plains	Terai	Indo-malayan.
Cardamine hirsuta	3	4	..	800—2,400	Terai—12,000	World.
Sisymbrium . . . . .	..	..	4	5,500 . . . . .	..	..
Capparis multiflora . . . . .	..	..	4	1,300	1,000—3,500	Assamo-burmese.
" tenera	2	..	..	600	unrecorded	Indo-burmese.
ROYDSIA SUAVEOLENS	1	..	..	plains	Terai—7,500	Assamese.
VIOLA PATRINII	1	2	3	4 plains—3,800	Terai—8,000	Old World.
" distans . . . . .	..	..	3	4,000—5,000	7,000—9,000	Iudo-assamese.
" glaucescens	1	..	3	4 plains—900	7,000—10,500	Himalayo-malayan.
" diffusa . . . . .	..	..	3	4 900—3,800	4,000—6,000	Assamo-chinese.
BENNETTIA LONGIPES	2	..	4	plains—1,500	..	Assamese.
GYNOCARDIA ODORATA	1	..	3	4 plains—3,600	Terai—3,500	Assamo-burmese.
Xanthophyllum Burkillii	2	3	..	600—700 . . . . .	..	Endemic.
Brachystemma calycinum	1	..	3	4 plains—2,700	1,000—7,000	Himalayo-burmese.
DRYMARIA CORDATA	1	..	3	4 plains—3,000	Terai—4,000	Pantropic.
PORTULACA OLE-RACEA	1	..	..	plains	—1,000	World.
HYPERICUM NEPAULENSE . . . . .	..	..	4	5,500	4,000—10,000	Indo-burmese.
" JAPONICUM	1	..	..	plains	Terai—5,000	Indo-australian.
GARCINIA PEDUNCULATA . . . . .	..	..	4	900 . . . . .	..	Assamese.
" Morella	2	3	..	600—2,000	..	Indo-malayan.
" stipulata . . . . .	..	3	4	800—4,800	2,000—7,500	Assamese.
Calophyllum polyanthum . . . . .	..	3	4	2,000—4,500	4,000—5,000	Assamo-burmese.
MESUA FERREA	2	3	..	plains—1,500	..	Indo-malayan.
Adinandra sp. . . . .	..	..	4	600 . . . . .	..	..
Eurya symplocina . . . . .	..	3	4	6,200	5,500—7,000	Himalayan.
" acuminata . . . . .	..	3	4	1,500—4,000	5,000—6,000	Indo-malayan.
" ? phyllanthoides . . . . .	..	3	..	5,100 . . . . .	..	Assamo-malayan.
ACTINIDIA CALLOSA . . . . .	..	..	4	(plains)—3,600	4,000—13,000	Himalayo-malayan.
Saurauja nepalensis . . . . .	..	3	4	700	2,000—8,000	Himalayo-burmese.
" ROXBURGHII . . . . .	..	..	4	2,500—4,700	Terai—4,000	Assamo-burmese.
" PUNDUANA . . . . .	..	3	4	700—3,800	2,000—5,000	Assamo-burmese.
SCHEMA NORONHAE . . . . .	..	3	..	1,650—2,200	Terai—5,000	Assamo-malayan
PYRENARIA BARRING-TONIAEFOLIA . . . . .	..	3	4	800—2,700	..	Assamese.
Camellia drupifera . . . . .	..	3	..	1,000	4,000—7,000	Assamo-burmese.
" lutescens . . . . .	..	3	..	6,200 . . . . .	..	Assamo-burmese.
Dipterocarpus pilosus . . . . .	..	2	..	plains . . . . .	..	Assamo-burmese.
Vatica Shingkeng . . . . .	..	2	3	4 600—2,400 . . . . .	..	Endemic.
SIDA RHOMBIFOLIA	1	..	3	plains—1,000	Terai—5,000	Pantropic.
URENA LOBATA	1	..	4	plains—2,000	Terai—4,000	Pantropic.
HIBISCUS FRAGRANS	1	..	3	.. plains—700	1,000—4,500	Assamese.
" VITIFOLIUS	1	..	..	plains	Terai	Indo-malayan.
" ABELMOSCHUS	1	..	..	plains . . . . .	..	Pantropic.
KYDIA CALYCINA	1	2	3	4 plains—3,800	2,000—4,000	Indo-Burmese.

	ABOR-LAND.				Sikkim.	Distribution.	
	Zones.	Height.					
BOMBAX MALABARI- CUM	1	2	3	4	plains—2,000	Terai—900	Indo-malayan.
STERCULIA URENS	1	2	..	..	plains . . . . .	..	Indian.
„ VILLOSA	1	..	..	..	plains . . . . .	..	Indo-burmese.
„ COCCINEA . . . . .	..	..	3	4	900—1,400	3,000—6,000	Assamo-malayan.
„ sp. . . . . .	..	2	..	..	600 . . . . .	..	..
ECHINOCARPUS STERCU- LIACEUS	1	2	..	4	plains—4,000	2,000	Assamo-burmese.
„ sp. . . . . .	..	..	..	4	4,000 . . . . .	..	..
Heritiera macrophylla . . . . .	..	2	3	..	600—2,800 . . . . .	..	Assamo-burmese.
PTEROSPERMUM ACERIFO- LIUM	1	2	3	4	plains—2,000	Terai—4,000	Himalayo- burmese.
„ sp. . . . . .	..	2	3	4	600—2,000 . . . . .	..	..
ABROMA FASTUOSA	1	2	3	4	plains—1,000	Terai—1,000	Himalayo- malayan.
BUETTNERIA ASPERA . . . . .	..	2	3	4	600—2,800	3,000—4,000	Assamo-burmese.
Grewia serrulata	1	2	3	4	plains—900	..	..
„ nana	1	..	..	..	plains . . . . .	..	..
TRIUMFETTA BARTRAMIA . . . . .	..	..	..	4	900—1,400	Terai—1,000	Old World.
„ CANA	1	..	..	4	plains—1,000	..	Assamo-burmese
CORCHORUS ACU- TANGULUS . . . . .	..	..	..	4	1,000	Terai	Indo-malayan
ELAEOCARPUS SIKKIMEN- SIS	1	2	3	..	plains—1,000	..	Assamese.
„ braccanus . . . . .	..	..	3	..	6,200 . . . . .	..	Assamo-burmese.
„ VARUNNA . . . . .	..	..	3	..	2,400	Terai—3,500	Himalayo- burmese.
HEPTAGE MADABLOTA	1	2	..	..	plains	Terai—2,000	Indo-malayan.
Aspidiopteris Roxburghii	1	..	..	4	plains—1,000	Terai—5,000	Assamo-burmese.
OXALIS CORNICU- LATA	1	..	3	4	plains—2,000	Terai—10,000	World.
IMPATIENS VIOLAEFOLIA . . . . .	..	..	..	4	700—2,700 . . . . .	..	Assamo-burmese.
„ arguta . . . . .	..	..	..	4	1,600—3,800	1,800—8,000	Assamese.
„ laevigata . . . . .	..	..	3	..	800—1,400 . . . . .	..	Assamese.
„ sp. . . . . .	..	2	..	..	600 . . . . .	..	..
„ TRIPETALA	1	..	..	..	plains	2,000—5,000	Assamese.
„ bracteolata . . . . .	..	..	..	4	600—2,000 . . . . .	..	..
„ racemosa . . . . .	..	..	..	4	3,600	6,000—10,000?	..
Evodia fraxinitolia . . . . .	..	..	..	4	800—3,700	Terai—8,000	Assamo-burmese.
XANTHOXYLON ACANTHO- PODIUM . . . . .	..	..	..	4	900—1,800	Terai—7,500	Himalayo- burmese.
„ HAMILTONIANUM	1	..	..	4	plains—1,300	unrecorded	Assamo-burmese
TODDALIA ASIATICA . . . . .	..	..	3	4	700—2,000	2,000—6,000	Indo-malayan.
GLYCO-MIS COCHIN- CHINENSIS	1	2	3	..	plains—2,000	Terai—7,000	Indo-australian.
„ sp. . . . . .	..	..	3	..	2,000 . . . . .	..	..
„ sp. . . . . .	..	..	3	..	2,000 . . . . .	..	..
„ sp. . . . . .	..	..	3	..	2,400—3,400 . . . . .	..	..
MICROMELUM PUBES- CENS	1	2	3	4	plains—1,200	Terai—4,000	Indo-malayan.
„ sp. . . . . .	..	..	..	4	1,000 . . . . .	..	..
MURRAYA EXOTICA . . . . .	..	2	3	4	plains—2,100	Terai	Indo-pacific.
CLAUSENA HEPTA- PHYLLA	1	2	..	..	plains . . . . .	..	Indo-burmese.
Citrus Aurantium	1	..	..	..	plains . . . . .	..	?
„ medica, v. limonum . . . . .	..	..	..	4	700	Terai—4,000	?
Ailanthus grandis	1	2	..	..	plains	1,000	E. Himalayan.
BRUCEA MOLLIS . . . . .	..	2	3	4	plains—1,700	2,000	Assamo-burmese.
lia Toosendam	1	..	..	..	plains . . . . .	..	Assamo-burmese.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.			Height.		
Dysoxylon binectarifer- um	1	..	..	plains	500	Indian.
„ PROCERUM	..	..	..	4 900—3,500	2,000—5,500	Assamo-malayan.
„ PALLENS	..	..	3	.. 700—1,500	unrecorded	Assamese.
CHRISOCHETON PANICULA- TUM	1	2	3	4 plains—2,400	..	Assamo-burmese.
Aglala perviridis	..	..	3	.. 2,400	2,000—3,000	Assamese.
„ CHITTAGONGA	..	..	3	4 700—4,600	..	Assamo-burmese.
„ sp.	..	..	..	4 3,900	..	..
AMOORA POLYSTACHYA	..	2	3	.. 600—3,500	Terai—3,000	Indo-malayan.
CEDRELA FEBRIFUGA	1	2	3	4 plains—2,600	Terai—6,000	Assamo-malayan.
CHICKRASSIA TABULARIS	..	2	3	4 600—2,000	1,000—3,000	Indo-malayan.
ERYTHROPALUM VAGUM	..	..	3	.. 700—2,400	2,000—5,000	Assamese.
LEPIONURUS SYLVESTRIS	1	2	..	.. plains—(7hills)	Terai	Assamo-malayan.
GOMPHANDRA AXILLARIS	..	..	3	.. 700—5,500	..	Assamese.
NATSIATUM HERPETICUM	1	2	..	4 plains—2,000	Terai—3,000	Assamo-burmese.
MIQUELIA KLEINII	1	..	..	.. plains	..	Assamese.
CARDIOPTERYX MOLUC- CANA	..	..	..	4 900—2,100	Terai	Assamo-malayan.
Euonymus kachinensis	..	..	3	.. 700	..	Assamo-burmese.
„ frigidus	..	..	3	.. 2,000	7,000—12,000	Assamese.
„ ?theaeifolius	..	..	3	.. 5,100—6,200	5,000—8,500	Assamese.
„ sp.	..	2	3	.. 600—6,200	..	..
„ sp.	..	..	3	.. 700—900	..	..
Celastrus Championii	..	..	3	.. 5,700	2,000—6,000	Assamo-malayan.
„ sp.	..	..	4	.. 800—1,200	..	..
MICROTROPIS DISCOLOR	..	..	3	.. 1,600—3,500	2,000—7,000	Himalayo- burmese.
„ sp.	..	..	3	4 4,000—5,500	..	..
Gymnosporia acuminata	..	..	3	4 700—2,600	2,000—5,000	Assamo-burmese.
„ sp.	..	..	3	4 1,000—3,600	..	..
SALACIA PRINOIDES	..	..	3	.. 1,400—2,000	6,000	Assamo-malayan.
„ latifolia	..	..	3	.. 2,400	unrecorded	Assamo-malayan.
„ sp.	..	2	..	.. 600	..	..
„ sp.	..	..	3	.. 2,400	..	..
VENTILAGO MADE- RASPATANA	..	..	..	4 4,000	unrecorded	Indo-burmese.
ZIZYPHUS JUJUBA	1	..	3	.. plains—1,400	Terai	Indo-malayan.
„ RUGOSA	1	..	3	.. plains—1,400	Terai—2,500	Indo-burmese.
RHAMNUS NEPALENSIS	1	..	3	4 plains—1,400	Terai—6,000	Assamo-burmese.
Hovenia dulcis	1	..	..	4 plains—900	1,000—5,000	? Chinese.
GOUANIA LEPTOS- TACHYA.	1	..	3	4 plains—1,400	Terai—4,000	Himalayo- malayan.
„ Rhamnacea	..	2	3	.. 600—1,700	..	..
VITIS REPENS	..	..	..	4 1,000	Terai—5,000	Indo-malayan.
„ heyneana	1	..	..	.. plains	Terai—5,000	Indo-burmese.
„ BRACTEOLATA	1	..	3	4 plains—1,500	Terai—3,000	Assamo-burmese.
„ obovata	1	2	..	.. plains	..	Assamese.
„ planicaulis	1	2	3	4 plains—4,700	Terai—5,000	Assamo-chinese.
„ LANCEOLARIA	1	2	3	.. plains—1,000	Terai—4,000	Indo-malayan.
„ rumicisperma	1	2	3	4 plains—4,700	Terai—7,000	Himalayo- malayan.
Leon aspera	..	..	3	4 700—900	Terai—5,000	Indian.
„ CRISPA	1	..	..	.. plains	Terai—1,000	Indo-burmese.
„ INDICA	..	..	3	.. 700	Terai—2,500	Indo-malayan.
„ TRIFOLIATA	1	2	..	.. plains	..	Assamese.
„ ROBUSTA	..	..	3	4 700—2,400	Terai—4,000	Indo-burmese.
ALLOPHYLUS ZEYLANICUS	1	..	..	.. plains	1,000—3,000	Indian or Assamese.
„ COBBE.	..	..	..	4 2,300—3,600	..	Indo-malayan.
AESCULUS PUNDUANA	1	2	..	.. plains	Terai—7,000	Assamo-burmese.

	ABOR-LAND.				Sikkim.	Distribution.		
	Zones.		Height.					
<i>Lepisanthes Listeri</i>	..	..	3	4	700—3,600	..	Endemic.
<i>APHANIA RUBRA</i>	2	3	4	500—2,000	Terai—3,000	Assamese.
<i>ACER NIVEUM</i>	..	..	3	..	4,200	..	Assamo-malayan.
„ <i>oblongum</i>	..	..	3	..	1,300—4,500	3,000—6,000	Himalayo-chinese.
„ <i>Thomsoni</i>	..	..	3	..	3,600—3,700	3,000—9,000.	Assamese.
<i>TURPINIA POMIFERA</i>	1	..	3	..	plains—2,400	Terai—7,000	Indo-malayan.	
<i>SABIA LANCEOLATA</i>	1	2	3	4	plains—2,000	Terai—5,000?	Assamese.	
<i>MELIOSMA DILLEN- IAEFOLIA</i>	..	..	3	4	900—2,400	8,000—10,000	Himalayan.
„ <i>SIMPLICIFOLIA</i>	1	2	3	4	plains—2,400	Terai—4,000	Indo-malayan.	
„ <i>PINNATA</i>	1	..	3	4	plains—1,400	1,000—2,000	Assamo-burmese.	
„ <i>sp.</i>	..	..	3	4	800—2,400	..	..
<i>REUS semialata</i>	1	..	..	..	plains	2,000—6,000	Himalayo-chinese.
„ <i>GRIFFITHII</i>	..	..	3	4	800—2,400	Terai—2,500	Assamese.
<i>MANGIFERA SYLVATICA</i>	..	..	3	..	1,000—2,400	Terai—3,000	Assamo-burmese.
<i>Holigarna sp.</i>	..	..	3	..	1,300	..	..
<i>TAPIRIA HIRSUTA</i>	1	2	3	4	plains—2,000	Terai—2,000	Assamo-burmese.	
<i>DRIMYCARPUS RACEMOSUS</i>	..	..	3	..	1,000—2,400	Terai—3,000	Assamo-burmese.
<i>Spondias axillaris</i>	..	..	3	4	800—4,000	1,000—3,000	Assamo-burmese.
<i>Coriaria nepalensis</i>	1	..	3	4	plains—900	Terai—1,100	Himalayo-burmese.	
<i>CROTALARIA ALATA</i>	1	..	3	..	plains—1,000	Terai	Himalayo-malayan.	
<i>MILLETIA pulchra</i>	..	2	3	..	600—1,800	..	Assamo-burmese.	
„ <i>PACHYCARPA</i>	1	..	..	..	plains	900—3,000	Assamo-burmese.
„ <i>piscidia</i>	..	..	3	..	2,400	..	Assamese.
<i>Gymnocladus chinensis</i>	..	..	3	..	4,000	..	..
<i>SMITHIA SENSITIVA</i>	1	..	..	..	plains	Terai	Indo-malayan.
<i>DESMODIUM CEPHA- LOTES</i>	1	..	..	..	plains	..	Indo-malayan.
„ <i>LAXIFLORUM</i>	1	..	..	..	plains	2,000—6,000	Indo-malayan.
„ <i>parvifolium</i>	1	..	..	..	plains	Terai	Indo-malayan.
<i>Shuteria vestita</i>	..	..	3	..	700—1,000	1,000—5,000	Indo-malayan.
<i>Dumasia villosa</i>	..	..	3	..	1,400—2,400	700—5,000	Old World.
<i>Mucuna sp.</i>	1	..	..	4	plains—700	..	..
<i>ERYTHRINA STRICTA</i>	1	2	3	4	plains—1,400	2,000—4,000	Indo-burmese.	
<i>MASTERSIA ASSAMICA</i>	..	..	3	4	700—1,300	..	Assamese.
<i>Pueraria bella</i>	..	..	..	4	800—4,700	..	Assamo-burmese.
<i>ATYLOSIA SCARA- BAEOIDES</i>	1	..	..	..	plains	Terai	Old World.
<i>FLEMINGIA CONGESTA</i>	..	..	3	4	700—800	Terai	Indo-malayan.
<i>Dalbergia tamarindifolia.</i>	..	..	3	4	800—2,200	Terai—3,000	Assamo-burmese.
„ <i>Oliveri</i>	..	..	3	4	1,500—1,600	Terai—3,000	Assamo-burmese.
<i>DALHOUSIEA BRACTEATA</i>	..	..	3	4	900—1,800	..	Assamese.
<i>MEZONEURON CUCUL- LATUM</i>	1	2	3	4	plains—3,200	Terai—5,000	Indo-malayan.	
<i>Gleditschia Delavayi</i>	..	..	3	..	700	..	Assamo-burmese
<i>CASSIA TORA</i>	1	..	..	..	plains	Terai	Pantropic.
<i>BAUHINIA RUFa</i>	..	..	3	..	1,600	..	Assamo-burmese.
„ <i>divergens</i>	1	..	..	4	plains—1,300	..	Assamo-burmese.
„ <i>PURPUREA</i>	1	2	3	4	plains—1,300	Terai—2,500	Himalayo-malayan.	
<i>Saraca?</i>	..	..	3	..	2,000	..	..
<i>Leucaena sp.</i>	..	..	..	4	2,700	..	..
<i>ACACIA INTSIA</i>	1	2	3	4	plains—2,000	Terai	Indo-malayan.	
„ <i>PENNATA</i>	1	2	3	..	plains—1,600	1,000—1,900	Old World.	
<i>ALBIZZIA PROCERA</i>	..	2	..	..	plains	1,900	Indo-malayan.
<i>Pithecolobium montanum</i>	..	..	..	4	4,400	3,500	Assamo-malayan.

	ABOR-LAND.				Sikkim.	Distribution.	
	Zones.		Height.				
<i>Prunus acuminata</i>	1	..	3	4	plains—4,000	4,000—9,000	Assamo-burmese.
<i>Rubus Hamiltonii</i>	1	..	3	..	plains—700	Terai—1,000	Assamese.
„ <i>Burkilli</i>	1	..	3	4	plains—3,500	..	Endemic.
„ <i>lineatus</i> . . . . .	..	..	3	..	4,700	5,000—9,000	Himalayo-malayan.
„ <i>ellipticus</i> . . . . .	..	..	..	4	800—3,500	3,000—7,000	Indo-burmese.
„ <i>LUCENS</i> . . . . .	..	2	3	4	plains—3,600	..	Assamo-burmese.
„ <i>LASIOCARPUS</i>	1	..	3	4	plains—3,500	4,000—8,000	Indo-malayan.
„ <i>ROSAEFOLIUS</i> . . . . .	..	..	..	4	plains—3,500	9,000—10,000	Himalayo-burmese.
<i>FRAGARIA INDICA</i>	1	..	3	4	plains—900	Terai—8,000	Indo-malayan.
<i>POTENTILLA KLEINIANA</i>	1	..	..	4	plains—2,400	3,000—8,500	Indo-malayan.
<i>Chrysosplenium nepalense</i> . . . . .	..	..	..	4	5,500	7,000—10,000	Assamo-chinese.
<i>Hydrangea</i> sp. . . . .	..	..	3	..	4,800	..	..
<i>DICHRONA FEBRIFUGA</i> . . . . .	..	..	3	4	1,500—4,400	5,000—8,500	Assamo-malayan.
<i>ALTINGIA EXCELSA</i>	1	2	3	4	600—4,000	..	Assamo-malayan.
<i>Carallia lanceaeifolia</i> . . . . .	..	2	..	4	600—4,000	..	Assamo-malayan.
<i>Terminalia chebula</i>	1	..	..	..	plains	900	Indo-malayan.
„ <i>MYRIOCARPA</i>	1	2	3	4	plains—3,800	Terai—4,500	Assamo-burmese.
<i>Calycopteris floribunda</i>	1	..	..	..	plains	..	Indo-malayan.
<i>COMBRETUM DASYSTACHYUM</i>	1	2	..	4	plains—2,200	..	Assamo-malayan.
<i>ILLIGERA KHASIANA</i>	1	..	3	..	plains—3,300	..	Assamo-burmese.
<i>EUGENIA WALLICHII</i> . . . . .	..	..	..	..	700	Terai—2,000	Assamo-burmese.
„ <i>aborensis</i> . . . . .	..	..	..	4	700—2,500	..	Endemic.
„ <i>tetragona</i> . . . . .	..	..	3	..	5,100	2,000—5,000	Assamo-burmese.
„ <i>BALSAMEA</i> . . . . .	..	..	3	..	700—3,300	Terai—3,000	Assamo-burmese.
„ sp. . . . .	..	..	..	4	4,700	..	..
„ sp. . . . .	..	..	..	4	4,400	..	..
„ sp. . . . .	..	2	..	..	600	..	..
<i>Osbeckia stellata</i> . . . . .	..	..	..	4	900—2,100	Terai—5,500	Himalayo-burmese.
„ <i>CRINITA</i>	1	..	..	..	plains	6,000—8,000.	..
„ <i>NEPALENSIS</i>	1	..	..	4	plains—900	Terai—6,000	Assamo-burmese.
„ <i>NUTANS</i> . . . . .	..	..	3	..	700—2,000	Terai—3,000	Assamo-burmese.
<i>MELASTOMA MALABATHRICUM</i>	1	2	..	4	plains—1,500	Terai—4,000	Indo-malayan.
„ <i>normale</i> . . . . .	..	..	3	4	700—2,500	1,000—6,000	Assamo-malayan.
<i>Oxyspora vagans</i>	1	..	3	4	plains—3,700	..	Assamo-burmese.
„ <i>CERNUA</i> . . . . .	..	..	3	..	700	..	Assamo-burmese.
<i>SARCOPYRAMIS NEPALENSIS</i> . . . . .	..	..	3	4	1,800—3,400	7,000—9,000	Assamo-malayan.
<i>MEDINILLA RUBICUNDA</i> . . . . .	..	..	3	..	2,400—4,000	2,500—4,000	Assamese.
„ <i>himalayana</i> . . . . .	..	..	3	..	6,200	2,500—4,000	Assamese.
<i>MEMECYLON CELESTRINUM</i> . . . . .	..	2	..	..	600	Terai—1,500	Assamo-malayan.
<i>DUABANGA SONNERATIODES</i>	1	2	3	4	plains—1,300	Terai—2,500	Assamo-burmese.
<i>CASEARIA VARECA</i>	1	..	3	4	plains—2,000	Terai—2,500	Assamo-burmese.
<i>HODGSONIA HETEROCLITA</i>	1	..	..	..	plains	1,000—5,000	Assamo-malayan.
<i>TRICHOSANTHES BRacteata</i>	1	..	..	4	plains—1,200	Terai—4,500	Indo-malayan.
„ <i>CORDATA</i>	1	..	..	..	plains	Terai—4,500	Assamo-burmese.
„ <i>CUCUMERINA</i>	1	..	..	..	plains	Terai—5,000	Indo-australian.
<i>MOMORDICA DIOICA</i>	1	..	..	..	plains	Terai—6,000	Indo-malayan.
<i>MELOTHRIA MADERASPATANA</i>	1	..	..	..	plains	Terai—4,500	Indo-malayan.
„ <i>perpusilla</i>	1	..	..	4	plains—3,600	2,000—6,000	Old World.
<i>Thaladiantha calcarata</i>	1	2	..	..	plains	3,000—4,500	Assamo-malayan.
<i>ACTINOSTEMMA TENERUM</i>	1	..	3	4	plains—4,000	..	Assamo-chinese.
<i>GYNOSTEMMA PEDATUM</i>	1	..	3	..	plains—2,400	3,000—7,000	Indo-malayan.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.	Height.				
<i>Alsomitra clavigera</i>	1	..	..	plains	3,500	Assamo-chinese.
<i>Cucurbitacea</i>	4	1,600—2,800	..
<i>Begonia inflata</i>	3	4	700—5,000	Assamese.
<i>laciniata</i>	3	4	800—5,400	5,000—7,000 Assamo-malayan.
<i>Griffithii</i>	3	4	700—4,500	Terai—2,500 Assamese.
<i>Rex</i>	4	700—3,000	Assamese.
<i>Burkillii</i>	3	4	700—3,900	.. Endemic.
<i>iridescens</i>	3	4	1,700—5,000	.. Endemic.
<i>scintillans</i>	3	4	4,500—6,200	.. Endemic.
<i>barbata</i>	4	600—1,000	unrecorded Assamo-burmese.
<i>abotensis</i>	..	2	3	4	600—3,000	.. Endemic.
MOLLUGO STRICTA	4	1,000	Terai—5,000 Indo-malayan.
<i>Hydrocotyle javanica</i>	3	4	700—3,400	Terai—9,000 Old World.
ROTUNDIFOLIA	1	..	..	4	plains—1,300	Terai—7,000 Indo-malayan.
CENTELLA ASIATICA	4	1,800—2,000	1,000 World.
<i>Sanicula europaea</i>	3	4	700—4,800	5,000—11,000 World.
<i>Pimpinella tenera</i>	3	4	5,000—5,500	10,000—15,000 Himalayan.
OENANTHE BEN- GHALENSIS	plains	..	Assamo-chinese.
<i>Aralia foliosa</i>	..	2	3	4	600—2,700	5,000 Assamese.
<i>Pentapanax Leschenaultii</i>	4	5,500	5,000—10,000 Indo-burmese.
ACANTHOPANAX ACULEATA	1	2	..	plains	..	Assamo-chinese.
<i>Schefflera venulosa</i>	3	4	1,300—4,500	1,300—5,000 Indo-australian.
HETERO PANAX FRAGRANS	1	2	3	4	plains—4,000	Terai—4,000 Himalayo- malayan.
<i>Brassaiopsis simplicifolia</i>	4	2,300	.. Endemic.
<i>SPECIOSA</i>	..	2	3	4	600—4,000	Terai—7,000 Assamo-burmese.
<i>ACULEATA</i>	4	1,300—2,000	2,000—5,000 Himalayo- burmese.
<i>magnifica</i>	3	4	700—3,100	.. Endemic.
<i>GRIFFITHII</i>	3	4	700—3,000	.. Assamo-burmese.
MACROPANAX UNDULATUM	1	..	3	4	plains—2,400	2,000—5,000 Assamo-burmese.
<i>oreophilum</i>	3	..	6,200	5,000—7,000 Himalayo- burmese.
MARLEA BEGONIAEFOLIA	1	..	..	plains	..	900—5,000 Himalayo- chinese.
SAMBUCUS JAVANICA	1	..	3	4	plains—3,500	2,000—10,000 Assamo-malayan.
VIBURNUM COLEBROOKIA- NUM	1	2	3	4	plains—3,200	Terai—5,000 Assamo-burmese.
ANTHOCEPHALUS INDICUS	3	..	1,500	Terai—800 Indo-malayan.
<i>Nauclera</i> sp.	3	4	800—3,500	..
UNCARIA SESSILIFRUCTUS	1	..	3	4	plains—2,400	Terai—3,000 Assamo-burmese.
<i>PILOSA</i>	1	..	3	..	plains—1,000	Terai—4,000 Himalayo- burmese.
<i>Wendlandia Wallichii</i>	3	4	600—2,400	Terai—5,500 Assamese.
HEDYOTIS SCANDENS	4	2,000—3,000	800—6,000 Assamo-burmese.
<i>VERTICILLATA</i>	..	2	3	4	600—3,200	Terai—5,000 Himalayo- malayan.
SPIRADICLIS CYLINDRICA	3	..	600—700	.. Assamo-burmese.
<i>BIFIDA</i>	3	..	1,000—1,400	.. Assamo-burmese.
<i>sp.</i>	3	4	1,000—1,600	..
POLYURA GEMINATA	3	..	3,600—4,300	.. Assamese.
Ophiorrhiza Mungos	4	3,400	.. Indo-malayan.
<i>sp.</i>	3	..	2,300	..
<i>heterostyla</i>	3	4	2,500—4,600	.. Endemic.
<i>argentea</i>	4	1,000	3,000—8,000
<i>ochroleuca</i>	4	1,800—4,800	1,000—5,500 Assamo-burmese.
<i>? calcarata</i>	3	..	2,400	.. Assamese.

	ABOR-LAND.		Sikkim.	Distributicn.
	Zones.	Height.		
<i>Carlemania Griffithii</i>	.. .. .	4 1,400	..	Assamese.
„ <i>TETRAGONA</i>	.. .. .	3 4 800—2,000	..	Assamese.
<i>SILVIANTHUS BRACTEATUS</i>	.. .. .	3 .. 2,400	..	Assamese.
„ <i>radiciflorus</i>	.. .. .	4 800	..	Assamese.
MUSSAENDA ROX-				
<i>BURGHII</i>	.. .. .	3 .. 1,400	Terai—4,000	Assamo-burmese.
„ <i>macrophylla</i>	.. .. .	3 4 600—2,100	Terai—5,000	Assamo-burmese.
„ <i>GLABRA</i>	.. .. .	3 .. 700	Terai—5,000	Assamo-burmese.
<i>ADENOSACME LONGIFOLIA</i>	.. .. .	3 4 700—5,500	2,000—5,000	Himalayo-malayan.
„ <i>stipulata</i>	.. .. .	3 4 2,400—3,000	2,000—5,500	Assamese.
„ <i>Listeri</i>	.. .. .	3 .. 1,400—1,800	..	Endemic.
<i>MYRIONEURON NUTANS</i>	1 .. .	3 4 plains—4,000	..	Assamo-burmese.
<i>WEBERA ODORATA</i>	.. .. .	2 3 .. 600—700	..	Assamo-malayan.
<i>Brachytome Wallichii</i>	.. .. .	3 4 2,300—2,400	..	Assamo-burmese.
RANDIA FASCICU-				
<i>LATA</i>	1 .. .	3 4 plains—2,100	Terai—4,000	Assamo-burmese.
„ <i>acuminata</i>	.. .. .	3 4 3,800	Terai—4,000	Assamo-malayan.
<i>GARDENIA CAMPANULATA</i>	1 .. .	.. .. plains	Terai	Assamo-burmese.
<i>VANGUERIA SPINOSA</i>	1 .. .	.. .. plains	Terai—5,000	Indo-malayan.
<i>IXORA ACUMINATA</i>	.. .. .	3 4 600—2,000	Terai—3,000	Assamese.
„ <i>SUBSESSILIS</i>	1 .. .	3 4 plains—5,500	..	Assamo-burmese.
<i>COFFEA BENGALENSIS</i>	1 2 ..	3 4 plains—700	Terai—3,000	Himalayo-malayan.
„ <i>KHASIANA</i>	.. .. .	3 4 5,000—6,200	..	Assamese.
<i>Damnacanthus indicus</i>	.. .. .	3 .. 6,200	..	Assamo-chinese.
<i>PLECTRONIA GLABRA</i>	.. .. .	3 .. 700—5,500	2,000	Assamo-malayan.
<i>PSYCHOTRIA FULVA</i>	1 2 ..	3 4 plains—4,700	..	Assamo-burmese.
„ <i>symplocifolia</i>	.. .. .	3 .. 3,300—4,400	..	Assamo-burmese.
„ <i>DENTICULATA</i>	1 2 ..	3 4 plains—3,800	2,000—6,000	Assamo-burmese.
„ <i>CALOCARPA</i>	.. .. .	3 4 2,000—4,700	Terai—3,000	Assamo-burmese.
„ <i>aborensis</i>	.. .. .	3 4 700—4,000	..	Endemic.
„ <i>sp.</i>	.. .. .	3 .. 6,200	..	..
„ <i>sp.</i>	.. .. .	4 2,000	..	..
<i>CHASALIA LURIDA</i>	1 .. .	.. .. plains	1,000—6,000	Indo-malayan.
<i>Lasianthus Biermanni</i>	.. .. .	3 4 3,900—6,200	5,000—7,000	Assamese.
„ <i>sp.</i>	.. .. .	3 .. 800—2,400	..	..
PAEDERIA FOETIDA	1 .. .	.. .. plains	Terai	Assamo-malayan.
„ <i>TOMENTOSA</i>	1 .. .	.. .. plains	Terai—5,000	Assamo-malayan.
<i>Rubia sikkimensis</i>	.. .. .	3 4 2,300—4,800	1,000—5,000	Assamese.
<i>Galium triflorum</i>	.. .. .	4 800	6,000—13,000	World.
<i>Vernonia roxburghii</i>	.. .. .	3 .. 1,000	..	Himalayo-burmese.
„ <i>CINEREA</i>	.. .. .	3 4 600—1,800	Terai—6,000	Old World.
„ <i>saligna</i>	.. .. .	3 4 600—1,400	Terai—3,000	Assamo-burmese.
„ <i>TALAUAEFOLIA</i>	.. .. .	3 .. 600—1,900	1,000—4,500	Assamo-burmese.
„ <i>volkammeriaefolia</i>	.. .. .	4 2,500—3,200	1,000—3,000	Assamo-burmese.
„ <i>scandens</i>	.. .. .	3 4 1,800—4,800	Terai—2,000	Assamo-burmese
A D E N O S T E M M A				
<i>LAVENIA</i>	1 .. .	3 4 plains—3,800	..	Pantropic.
<i>Eupatorium Reevesii</i>	.. .. .	3 .. 600	..	Himalayo-chinese.
<i>AGERATUM CONYZOIDES</i>	1 2 ..	3 4 plains—2,000	Terai—7,000	Pantropic.
DICHROROCEPHALA LATI-				
<i>FOLIA</i>	.. .. .	3 4 1,000—3,600	Terai—8,000	Old World.
<i>Microglossa volubilis</i>	.. .. .	4 1,400	..	Assamo-malayan.
<i>Conyza japonica</i>	1 .. .	3 4 plains—3,600	Terai—6,500	Himalayo-chinese
„ <i>VISCIDULA</i>	.. .. .	3 4 600—2,500	Terai—4,000	Indo-australian.

	ABOR-LAND.				Sikkim.	Distribution.	
	Zones.		Height.				
BLUMEA GLOMERATA	..	..	3	..	1,000 . . .	Terai—2,000	Himalayo-malayan.
.. LACERA	..	2	3	..	600—1,000 . . .	1,000—4,000	Old World.
.. MACROSTACHYA	1	..	..	..	plains . . .	Terai . . .	Assamese.
.. LACINIATA	..	..	3	..	1,000 . . .	Terai—4,000	Indo-malayan.
.. MEMBRANACEA	1	..	3	4	plains—900 . . .	Terai—4,000	Indo-malayan.
.. PROCERA	..	..	3	4	1,000—1,400 . . .	Terai—6,000	Assamo-burmese.
.. MYRIOCEPHALA	1	..	3	..	plains—1,000 . . .	..	Assamo-burmese.
.. DENSIFLORA	..	..	3	..	1,000 . . .	unrecorded . . .	Assamo-malayan.
.. AROMATICA	..	..	3	4	600—1,400 . . .	1,000—5,000	Himalayo-malayan.
.. BALSAMIFERA	1	2	3	4	plains—2,100 . . .	Terai—4,000	Assamo-malayan.
Anaphalis araneosa	..	..	..	4	2,000—3,400 . . .	5,000—13,000	Indo-burmese.
GNAPHALIUM LUTEO-ALBUM	1	..	3	4	plains—2,000 . . .	3,000—11,600	Pantropic.
.. PURPUREUM	..	..	3	..	1,000 . . .	..	not determinate.
XANTHIUM STRUMARIUM	1	..	..	..	plains . . .	Terai—2,000	Pantropic.
SIEGESBECKIA ORIENTALIS	1	..	3	..	plains—1,400 . . .	Terai—8,000	Pantropic.
SPILANTHES ACNELLA	1	..	3	4	(plains)—3,600 . . .	3,000 . . .	Pantropic.
BIDENS PILOSA	1	..	3	4	plains—2,100 . . .	Terai—8,000	Pantropic.
ARTEMISIA VULGARIS	1	..	..	4	plains—2,300 . . .	900—9,000	Old World.
Gynura angulosa	..	..	..	4	plains—2,000 . . .	Terai—8,500	Indo-burmese.
.. sarmentosa	1	..	..	..	plains . . .	..	Assamo-malayan.
EMILIA SONCHIFOLIA	1	..	3	4	plains—2,000 . . .	Terai—3,700	Old World.
Senecio Walkeri	..	..	3	4	900—4,400 . . .	2,000—6,500	Indo-malayan.
.. trilingulatus	..	..	..	4	3,000 . . .	5,000—7,000	Assamo-burmese.
SAUSSUREA AFFINIS	1	..	..	..	plains . . .	..	Assamo-chinese.
Ainsliaea pteropoda	..	..	3	..	6,200 . . .	6,000—10,000	Himalayo-burmese.
CREPIS JAPONICA	1	2	3	4	plains—4,000 . . .	Terai—9,000	Old World.
Lactuca brevistrostris	1	..	..	..	plains . . .	..	Assamo-malayan.
.. POLYCEPHALA	1	..	..	..	plains . . .	Terai—5,000	Himalayo-burmese.
.. gracilis	..	..	3	4	600—900 . . .	4,000—9,000	Himalayo-burmese.
Prenanthes scandens	..	..	..	4	3,400—3,600 . . .	4,000—9,000	Assamese.
SONCHUS ARVENENSIS	..	..	3	4	600—1,000 . . .	6,000 . . .	World.
Pratia nummularia	..	..	..	4	900—4,000 . . .	Terai—8,000	Assamo-malayan.
.. montana	..	..	3	..	5,700 . . .	5,000—7,400	Assamo-malayan.
LOBELIA AFFINIS	..	2	3	4	600—2,100 . . .	Terai—6,500	Indo-malayan.
Campanumoea javanica	..	..	..	4	3,400 . . .	3,000—7,000	Assamo-malayan.
.. parviflora	1	..	3	4	(plains)—1,000 . . .	700—5,000 . . .	Assamo-burmese.
.. sp.	..	..	3	..	2,000 . . .	..	..
Campanula cana	1	..	..	..	plains . . .	..	Himalayan.
Agapetes setigera	..	..	3	..	1,500—4,200 . . .	..	Assamo-burmese.
.. grandiflora	..	..	3	4	600—4,200 . . .	..	Assamo-burmese.
.. nutans	..	..	3	..	5,100 . . .	..	Endemic.
.. marginata	..	..	3	..	3,800—5,100 . . .	..	Endemic.
.. angulata	..	..	3	..	5,100 . . .	..	Endemic.
Vaccinium sp.	..	..	..	4	5,500 . . .	..	..
.. venosum	..	..	3	4	4,500—6,200 . . .	4,000—7,000	Assamese.
Pieris ovalifolia	..	..	3	..	5,100—6,200 . . .	2,000—12,000	Himalayo-chinese.
Rhododendron calophyllum.	..	..	3	..	5,100—6,200 . . .	..	Assamese.
PLUMBAGO ZEYLANICA	1	..	..	..	plains . . .	Terai—2,500	Old World.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.	Height.				
LYSIMACHIA JAPONICA	1	...	...	4 (plains)—5,500	2,000—7,000	Himalayo-malayan.
MAESA RAMENTACEA	..	..	3	1,700	..	Assamo-malayan.
" sp.	..	..	4	900	..	..
" INDICA	1	..	3	4 plains—3,000	1,000—6,500	Indo-malayan.
" permollis	..	..	3	4 600—4,000	..	Assamo-malayan.
Embelia Ribes	..	..	3	4 1,500—4,000	Terai—6,000	Indo-malayan.
" parviflora	..	..	3	4 2,100—5,500	..	Assamo-burmese.
Sadiria Griffithii	..	..	3	4 2,400—4,000	..	Assamo-burmese.
" Boweri	..	..	3	4 6,200	..	Endemic.
" Amblyanthopsis	..	..	..	..	..	..
" MEMBRANACEA	..	..	3	4 600—800	..	Assamese.
Ardisia virens	1	..	3	.. plains—2,000	..	Assamo-malayan.
" Thomsonii	..	..	3	.. 2,400	..	Assamese.
" rhynchophylla	..	..	3	4 600—2,100	..	Assamese.
" sp.	..	..	3	4 2,400—6,200.	..	..
" sp.	..	..	4	900	..	..
" sp.	..	..	3	.. 2,000	..	..
" sp.	..	..	3	4 3,500—4,700.	..	..
" sp.	..	2	..	.. 700	..	..
SARCOSPERMA ARBOREUM	..	..	3	.. 600—2,400	1,000—4,000	Assamo-burmese.
Bassia butyracoides	..	..	3	4 800—3,800	..	Endemic.
Diospyros sp.	..	..	3	.. 6,200	..	..
" sp.	..	..	3	.. 700—4,000	..	..
SYMPLOCOS SPICATA	1	..	..	.. plains	Terai—4,000.	Indo-malayan.
" javanica	..	..	3	4 1,500—2,300.	Terai	Himalayo-malayan.
" glomerata	..	..	3	.. 6,200	1,000—8,000.	Assamo-burmese.
" Hookeri	..	..	3	.. 2,000	..	Assamo-burmese.
STYRAX SERRULATUM	..	2	3	4 600—3,600	3,000—9,000.	Assamo-burmese.
" sp.	..	..	4	4,700	..	..
Parastyrax Lacei	..	..	3	4 2,400—4,700.	..	Assamo-burmese.
JASMINUM UNDULATUM	1	..	..	.. plains	1,000—5,000.	Assamo-chinese.
" coarctatum	..	2	..	.. 600	..	Assamo-burmese.
" anastomosans.	1	2	3	.. plains—700	Terai—2,000.	Assamo-burmese.
" flexile	1	2	3	.. plains—700	..	Assamese.
Linociera ternifolia	..	..	3	.. plains—700	..	Assamo-burmese.
" MACROPHYLLA	1	2	3	.. plains—2,000	..	Assamo burmese.
OLEA DIOICA	1	..	..	.. plains	Terai	Indo-burmese.
LIGUSTRUM ROBUSTUM	1	..	..	.. plains	..	Assamo-malayan.
MYXOPYRUM SMILACIFOLIUM	1	..	3	4 plains—1,300	? Terai	Indo-malayan.
MELODINUS MONOGYNUS	..	..	..	4 3,900	..	Assamo-malayan.
RAUWOLFIA SERPENTINA	1	..	..	.. plains	Terai—4,500.	Indo-malayan
Alyxia sp.	..	..	3	4 4,400—5,100.	..	..
ALSTONIA SCHOLARIS	1	..	3	.. plains—2,000	..	Old World.
ERVATAMIA DIVARICATA	..	..	3	4 1,400—2,400.	Terai—2,000.	Himalayo-burmese.
Wrightia coccinea	..	..	3	.. 2,300	Terai—4,000.	Assamo-burmese.
Beaumontia grandiflora	..	2	3	4 600—900	1,000—4,000.	Assamo-burmese.
EODYSANTHERA MICRANTHA	..	..	3	4 600—2,400	Terai—5,000	Assamo-malayan.
TRACHELOSPERMUM FRAGRANS	1	..	..	.. plains	2,000—6,000.	Himalayo-burmese.
ASCLEPIAS CURASSAVICA	1	..	..	.. plains	Terai—2,000.	nct determinate.

	ABOR-LAND.				Sikkim.	Distribution.	
	Zones.	Height.					
<i>Marsdenia tinctoria</i> .	1	..	..	4	plains—1,300	2,000—3,000.	Assamo-malayan.
<i>TYLOPHORA EXILIS</i>.	..	..	..	4	1,300 . .		Himalayo-malayan.
<i>Hoya fusca</i> . . . . .	..	..	3	..	6,200 . . . .	..	Assamese.
„ <i>ARNOTTIANA</i>	1	..	..	..	plains	1,000—3,000.	E. Himalayan.
<i>BUDDLEIA ASIATICA</i> .	..	2	3	4	600—2,000 . .	Terai—6,000.	Indo-malayan.
„ <i>candida</i> . . . . .	..	..	..	4	800—900 . . .	..	Endemic.
<i>FAGRAEA OBOVATA</i>.	..	..	3	..	700 . . . . .	..	Indo-malayan.
<i>Exacum teres</i>	1	..	3	..	plains—600 . .	1,000—4,000.	Assamo-burmese.
<i>CORDIA OBLIQUA</i>	1	..	..	..	plains . . . .	..	Old World.
<i>Ehretia Wallichiana</i> . . . . .	..	2	..	..	plains	2,000—7,000.	Assamo-burmese.
<i>RHABDIA LYCIOIDES</i>	1	..	..	4	plains—900 . .	Terai	World.
<i>TOURNEFORTIA CANDOL- LEI</i>	1	..	..	4	plains—1,400 . .	..	Assamo-burmese.
„ <i>VIRIDIFLORA</i>	1	..	3	..	plains—1,400 . .	..	Assamese.
„ <i>khasiana</i>	1	..	..	..	plains . . . .	..	Assamese.
<i>Trichodesma khasianum</i> . . . . .	..	..	3	..	1,700—1,900.	..	Assamese.
<i>Cynoglossum micran- thum</i> . . . . .	..	..	3	4	900—3,600 . .	3,000—8,000.	Indo-malayan.
„ <i>glochidiatum</i>	1	..	..	..	plains . . . .	..	Assamo-burmese
<i>BOTHRIOSPERMUM TENELLUM</i>	1	..	..	..	plains . . . .	..	Himalayo-chinese.
<i>ARGYREIA ARGENTEA</i>	1	..	..	4	plains—1,400 . .	Terai	Assamo-burmese .
<i>LETTSONIA STRIGOSA</i>	1	..	..	..	plains	Terai—2,000.	Assamo-burmese.
„ <i>sikkimensis</i> . . . . .	..	..	..	4	1,000—1,900.	3,000	Assamese.
<i>IPOMOEA KINGII</i>	1	..	..	..	plains	3,000—5,000.	Assamo-burmese.
„ <i>sp.</i>	..	..	3	4	800—2,000 . .	..	..
<i>MERREMIA VITIFO- LIA</i>	1	..	..	..	plains	500—3,000 . .	Indo-malayan.
<i>PORANA PANICULATA</i>	1	2	3	4	plains—800 . .	Terai—4,500.	Himalayo-malayan.
<i>SOLANUM NIGRUM</i>	1	..	3	4	plains—1,500 . .	Terai—8,000.	World.
„ <i>SPIRALE</i> . . . . .	..	..	3	4	600—1,600 . .	Terai—9,000.	Assamo-burmese.
„ <i>VERBASCIFOLIUM</i>	1	2	3	4	plains—2,000 . .	1,000—4,400 . .	World.
„ <i>SUBTRUNCATUM</i> . . . . .	..	..	3	..	1,000	Terai—1,500.	Assamo-burmese.
„ <i>crassipetalum</i> . . . . .	..	..	3	4	600—1,000 . .	2,000—8,000.	Assamo-burmese.
„ <i>FEROX</i> . . . . .	..	..	3	..	1,500 . . . . .	..	Indo-malayan.
„ <i>TORVUM</i>	1	..	..	..	plains	1,000—3,000.	World.
„ <i>INDICUM</i>	1	..	3	4	plains—2,600 . .	Terai—4,000.	Indo-malayan.
<i>PHYSALIS MINIMA</i>	1	..	..	4	plains—1,400 . .	Terai . . . .	..
<i>MIMULUS NEPALENSIS</i> . . . . .	..	2	..	..	500	6,500—10,000	Assamo-chinese.
<i>Mazus surculosus</i> . . . . .	..	..	3	4	600—1,200 . .	3,000—10,000	Himalayo-assamese.
<i>DOPATRIUM JUN- CEUM</i>	1	..	..	..	plains . . . .	..	Indo-malayan.
<i>CURANGA PEL-TERRAE</i>	1	..	..	4	plains—2,200 . .	2,000—3,000.	Assamo-malayan.
<i>Torenia edentula</i> . . . . .	..	..	..	4	1,000	1,000—7,000.	Assamese.
„ <i>vagans</i>	1	..	3	4	plains—600 . .	Terai—8,000.	Assamo-burmese.
<i>VANDELLIA PUSILLA</i>	1	..	..	..	plains . . . .	..	Old World.
„ <i>CORDIFOLIA</i>	1	..	..	..	plains . . . .	..	Indo-malayan.
<i>ILYSANTHES CILIATA</i> . . . . .	..	..	3	4	1,000—2,400 . .	2,500—7,000.	Indo-malayan.
„ <i>ANTIPODA</i>	1	..	..	..	plains	Terai	Indo-malayan.
<i>SCOPARIA DULCIS</i>	1	..	..	..	plains	Terai—5,000.	intruder.
<i>VERONICA JAVANICA</i>	1	..	3	4	plains—3,600 . .	3,000—7,000.	Indo-malayan.
<i>CENTRANTHERA HIS- PIDA</i>	1	..	..	..	plains . . . .	..	Indo-malayan.
<i>AESCHYNANTHUS GRACI- LIS</i> . . . . .	..	..	3	4	1,300—4,500 . .	1,500—4,500.	Assamo-malayan.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.		Height.			
<i>AESCHYNANTHUS</i>						
<i>monetaria</i>	3	4	800—2,500	Endemic.
<i>micrantha</i>	3	..	800	2,000 . . . Assamo-burmese.
<i>ACUMINATA</i>	..	1 2	3	4	plains—1,000	1,000—2,000. Assamo-burmese.
<i>sp.</i>	3	..	4,800—6,200.	..
<i>Lysionotus Griffithii</i>	3	4	2,400—3,000.	3,000—6,000. Assamo-burmese.
<i>serrata</i>	3	4	600—1,500	1,800—8,000. Himalayo-burmese.
<i>Chirita Hookeri</i>	4	3,800	.. Assamese.
<i>BOEICA FILIFORMIS</i>	3	..	1,500	.. Assamo-burmese.
<i>fulva</i>	4	3,800	.. Assamo-burmese.
<i>Tetraphyllum bengalense</i>	3	4	800—2,200	.. Assamese.
<i>BOEA HERBACEA</i>	4	900	.. Assamo-burmese.
<i>STAUANTHERA UMBROSA.</i>	3	4	800—1,300	.. Assamo-malayan.
<i>RHYNCHOTECHUM ELLIPTICUM</i>	..	1 ..	3	4	plains—3,800	Terai—3,500. Assamo-burmese.
<i>VESTITUM</i>	3	..	1,000	2,500—4,000. Assamo-burmese.
<i>calycinum</i>	3	..	1,000	.. Assamese.
Gesneracea	3	4	900—5,700	..
<i>OROXYLUM INDICUM</i>	1	..	..	..	plains	Terai—1,000. Indo-malayan.
<i>STEREOSPERMUM CHELO-NOIDES</i>	1	..	3	4	plains—1,500	Terai—2,000. Indo-burmese.
<i>THUNBERGIA GRANDIFLORA</i>	..	2 ..	..	..	600	600—9,000 . Assamo-chinese.
<i>COCCINEA</i>	..	1 2	3	4	plains—3,500	7,000—8,000 Himalayo-burmese.
<i>Ruellia sp.</i>	4	4,700	..
<i>Strobilanthes aborensis</i>	1	..	3	4	plains—1,800	.. Assamese.
<i>glomeratus</i>	1	2 ..	..	..	plains	.. Assamo-burmese.
<i>MACROSTEGIUS</i>	..	2 3	4	600—1,500	.. Assamo-burmese.	
<i>Burkillii</i>	..	2 3	..	600—700	.. Endemic.	
<i>DISCOLOR</i>	..	2 ..	..	600	.. Assamese.	
<i>SECUNDUS</i>	3	4	600—3,000	.. Assamese.
<i>COLORATUS</i>	..	2 ..	..	600	Terai—5,000. Assamese.	
<i>sp.</i>	3	4	800—4,000	..
<i>tenax</i>	1	..	..	pl ins	.. Endemic.	
<i>sp.</i>	3	..	3,500—4,000.	..
<i>? sp.</i>	4	4,700	..
<i>sp.</i>	3	..	6,200	..
<i>sp.</i>	4	700—3,200	..
<i>ACANTHUS LEUCOSTACHYUS</i>	3	4	700—1,000	.. Assamo-burmese.
<i>ERANTHEMUM PALATIFERUM</i>	1	..	..	..	plains	Terai—3,000. Assamo-burmese.
<i>CODONACANTHUS PAUCIFLORUS</i>	3	4	700—3,000	.. Assamo-chinese.
<i>Cistacanthus sp.</i>	4	4,700	..
<i>PHLOGACANTHUS CURVIFLORUS</i>	3	4	600—1,000	.. Assamo-burmese.
<i>Wallichii</i>	4	800—5,000	.. Assamese.
<i>asperulus</i>	3	..	4,800	.. Assamese.
<i>parviflorus</i>	3	..	700	.. Assamo-burmese.
<i>THYRSIFLORUS</i>	1	..	..	..	plains	Terai—4,000. Himalayo-burmese.
<i>GUTTATUS</i>	..	2 3	..	plains—1,800	.. Assamo-burmese.	
<i>GRACILIS</i>	1	2 3	4	plains—4,400	.. Assamese.	
<i>JUSTICIA GENDARUSSA</i>	1	..	3	..	plains—1,400	Terai . . . Indo-malayan.
<i>vasculosa</i>	..	2 3	4	600—1,600	.. Assamo-malayan.	
<i>sp.</i>	3	4	800—4,500	..
<i>sp.</i>	3	4	1,300—1,400.	..

	ABOB-LAND.				Sikkim.	Distribution.	
	Zones.		Height.				
<i>Rhinacanthus grandiflorus</i>	..	2	3	..	600—1,500	..	Endemic.
" sp.	..	..	3	..	5,500	..	..
<i>Dianthera</i> sp.	..	..	..	4	700—1,200	..	..
RUNGIA REPENS	1	..	..	..	plains	Terai	Indo-burmese.
" PARVIFLORA	1	..	..	..	plains	..	Indo-burmese.
<i>Peristrophe tinctoria</i>	1	..	..	..	plains	Terai	..
" FERA	1	2	3	4	plains—1,500	..	Assamo-burmese.
CALICARPA ARBOREA	1	..	3	4	plains—3,700	Terai—2,000.	Himalayo-burmese.
<i>VITEX HETEROPHYLLA</i>	..	..	3	..	2,400	Terai—5,000.	Assamo-malayan.
CLERODENDRON GRIFFITHIANUM	..	2	3	4	600—2,400	..	Assamo-burmese.
" NUTANS	..	2	3	..	600—3,000	Terai—4,000.	Assamo-burmese.
" COLEBROOKIANUM	1	..	..	..	plains	1,000—4,000.	Assamo-burmese.
" sp.	..	..	3	4	2,400—2,600.	..	..
<i>Holmskioldia sanguinea</i>	..	..	3	4	1,800—2,400.	900—5,000	Himalayo-burmese.
<i>Caryopteris paniculata</i>	..	..	3	4	1,000—2,400.	2,000—6,000.	Assamo-burmese.
OCIMUM BASILICUM	1	..	..	..	plains	Terai—2,000.	Old World.
PLECTRANTHUS COETSA	1	..	..	4	plains—1,300	3,000—7,000.	Indo-burmese.
" TERNIFOLIUS	1	..	..	..	plains	Terai—4,000.	Himalayo-burmese.
" <i>Griffithii</i>	..	..	3	4	700—4,400	..	Endemic.
" sp. ?	..	..	3	4	2,000—4,800.	..	..
<i>Coleus parviflorus</i>	1	..	..	..	plains	..	intruder.
<i>Pogostemon glaber</i>	..	..	..	4	3,100	1,000—3,000.	Assamo-burmese.
" <i>elscholtzioides</i>	..	..	3	4	800—1,800	..	Assamese.
" INTERMEDIUS	..	..	3	..	1,400	1,000—3,000.	Indo-burmese.
ELSCHOLZIA BLANDA	1	..	..	4	plains—2,000	4,000—6,000.	Assamo-burmese.
" sp. ?	..	..	3	4	1,300—2,400.	..	..
<i>Mosla dianthera</i>	1	..	..	..	plains	Terai—5,000.	Himalayo-burmese.
CALAMINTHA GRACILIS	..	..	..	4	800—3,000	..	Assamo-malayan.
ANISOMELES INDICA	1	..	..	4	plains—1,300	Terai—5,000.	Indo-malayan.
ACHYROSPERMUM WALLICHIANUM	..	2	3	4	600—1,400	900—6,000	Assamo-burmese.
<i>Stachys oblongifolia</i>	1	..	..	..	plains	..	Assamese.
LEUCAS LAVANDULIFOLIA	1	..	3	..	plains—1,400	Terai—1,000.	Old World.
PARAPHLOMIS RUGOSA	..	..	3	..	900	2,000—5,000.	Assamo-malayan
<i>Gomphostemma aborensis</i>	..	..	3	4	700—2,000	..	Endemic.
" <i>niveum</i>	1	..	..	..	plains	..	Assamese.
" LUCIDUM	..	..	3	4	2,200—4,000.	..	Assamo-burmese.
AJUGA MACROSPERMA	..	..	3	4	600—3,800	Terai—9,000.	Himalayo-burmese.
PLANTAGO MAJOR	1	..	3	4	plains—2,000	4,000—13,000	Old World.
DEERINGIA AMARANTHOIDES	1	..	3	4	plains—2,100	Terai—4,000	Himalayo-malayan.
CELOSIA ARGENTEA	1	..	..	4	plains—2,000	Terai—1,800.	Pantropic.
AMARANTUS SPINOSUS	1	..	..	..	plains	Terai—3,700.	..
" GANGETICUS	1	..	..	..	plains	..	Pantropic.
" VIRIDIS	1	..	..	..	plains	Terai—900	Pantropic.
" POLYGAMUS	1	..	..	..	plains	Terai	Pantropic.
CYATHULA PROSTRATA	..	..	..	4	900—1,500	Terai—4,000.	Pantropic.
<i>Aerva scandens</i>	..	..	3	..	1,500	1,200—9,000.	Indo-malayan

	ABOR-LAND.		Sikkim.	Distribution.
	Zones.	Height.		
ACHYRANTHES AS- PERA . . . . .	.. .. .	4	800—1,500 .	Terai—5,100. Pantropic.
CHENOPODIUM ALBUM	1 .. 3	4	plains—1,300	Terai—9,000 World.
Polygonum virginianum . . . . .	.. .. .	4	2,000—5,500	Terai—8,000 World.
„ BARBATUM . . . . .	.. .. .	4	600	Terai—2,000. Old World.
„ POSUMBU	1 .. 3	4	plains—2,600	1,000—8,000. Himalayo- malayan.
„ HYDROPIPER . . . . .	.. .. .	4	1,800	5,000—6,000 . World.
„ MACRANTHUM	1 .. .. .	..	plains . . . . .	.. Assamese.
„ alatum . . . . .	.. .. .	4	3,000—3,100.	1,000—13,000 Old World.
„ runcinatum . . . . .	.. .. .	4	2,500	3,000—12,000 Assamo-malayan.
„ capitatum	1 .. 3	4	plains—4,000	3,000—10,000 Himalayo- chinese.
„ CHINENSE	1 .. 3	4	plains—4,000	Terai—9,000. Indo-malayan.
Fagopyrum cymosum . . . . .	.. .. .	3	1,500—2,400.	2,500—11,000 Himalayo- chinese.
SAPRIA HIMALAYANA . . . . .	.. .. .	3	4 1,000—4,700.	.. Assamo-burmese.
ARISTOLOCHIA INDI- CA . . . . .	.. .. .	3	2,400 . . . . .	.. Indo-burmese.
„ SACCATA . . . . .	.. .. .	3	1,800	2,000—5,000 Himalayo-assa- mese.
HOUTTUYNIA CORDATA	1	4	plains—3,000	2,500—6,000 Himalayo- chinese.
PIPER pedicelloseum . . . . .	.. .. .	2	600	2,000—6,000 Assamese-mala- yan.
„ PEEPULOIDES . . . . .	.. .. .	3	4 600—1,200 .	1,800—6,000 Assamese.
„ THOMSONI	1 2 3	4	plains—3,600	Terai—4,000 Assamese.
„ nepalense . . . . .	.. .. .	3	1,500	3,000—7,000 Himalayo- assamese.
„ nigrum . . . . .	.. .. .	3	4 700—2,400 .	4,000
„ ATTENUATUM	1	3	.. plains—700 .	Terai—4,000. Assamo-burmese
„ sp. . . . .	.. .. .	3	4 600—4,000 .	.. Assamese.
„ GLABRIMENTUM . . . . .	.. .. .	3	700—2,400 . . . . .	.. Assamese.
„ curtistipes . . . . .	.. .. .	3	4 3,100—3,700	Terai Assamese.
„ DEKHOANUM . . . . .	.. .. .	3	2,400 . . . . .	.. Assamese.
„ DIFFUSUM . . . . .	.. .. .	3	700—800	1,000—7,000 Assamo-burmese.
„ hymenophyllum	1 2 3	4	plains—4,700	.. Indo-assamese.
Peperomia reflexa . . . . .	.. .. .	3	3,500—6,200	4,000—7,000 Indo-malayan.
„ PELLUCIDA	1 .. .. .	..	plains	Terai—3,000. intruder.
CHLORANTHUS OFFICINALIS	1 2 3	4	plains—4,700	700—4,000 Assamo-malayan.
KNEMA longifolla . . . . .	.. .. .	3	4 600—2,300 .	1,000 Assamo-burmese.
„ sp. . . . .	.. .. .	4	2,300 . . . . .	.. Endemic.
CRYPTOCARYA ANDER- SONII . . . . .	.. .. .	3	4,700 . . . . .	.. Assamese.
„ AMYGDALINA	1 .. .. .	..	plains	800—2,500 . Assamo-burmese.
BEILSCHMIEDIA ROXBUR- GHIANA . . . . .	.. .. .	2	600	Terai—2,000 Himalayo- burmese.
„ sp. . . . .	.. .. .	3	2,400 . . . . .	.. .. .
„ sp. ? . . . . .	.. .. .	3	2,400 . . . . .	.. .. .
Cinnamomum Tamala . . . . .	.. .. .	2	600 . . . . .	.. Himalayo- burmese.
„ OBTUSIFOLIUM	1 2 3	4	plains—3,600	1,000—7,000 Assamo-burmese.
„ GLANDULLIFERUM . . . . .	.. .. .	3	2,400	2,000 Assamo-burmese.
Machilus edulis . . . . .	.. .. .	4	3,600	5,000—6,000 E. Himalayan.
„ Gammieana . . . . .	.. .. .	3	2,000	5,000—7,000 E. Himalayan.
„ Gamblei . . . . .	.. .. .	4	600—2,100 .	Terai—4,000 Himalayo- burmese.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.	Height.				
<i>Cryptocarya</i> ?	3	2,000	..	..
<i>Actinodaphne</i> ?	4	3,600	..	..
.. sp.	3	4,000	..	..
LITSEA CITRATA	1	..	3	4 plains—5,500	Terai—9,000	Assamo-malayan.
.. <i>lancifolia</i>	..	2	3	600—2,400	Terai—7,000	Assamo-burmese.
.. POLYANTHA	1	..	3	plains—1,400	Terai—2,500	Indo-burmese. } Assamo-burmese.
.. <i>khasiana</i>	1	2	3	700	Terai—3,000	Assamo-burmese.
.. SALICIFOLIA	..	2	3	4 600—2,000	Terai—6,300	Assamo-burmese.
.. LAETA	3	4 700—1,200	Terai—6,000	Assamese.
.. sp.	3	6,200	..	..
.. sp.	4	2,000	..	..
.. sp. ?	4	2,600	..	..
.. sp.	4	800	..	..
<i>Lindera pulcherrima</i>	3	5,100	7,000—9,000	Himalayo-burmese.
Lauracea	3	5,100	..	..
<i>Helicia erratica</i>	3	6,200	2,000—6,000	Assamo-burmese.
.. sp.	3	3,800—4,000	..	..
.. sp.	4	4,700	..	..
.. sp.	4	1,900	..	..
<i>Daphne involucrata</i>	3	1,500—6,200	4,000—6,000	Assamo-burmese.
<i>Elaeagnus pyriformis</i>	..	2	3	500—800	Terai—2,000	E. Himalayan.
<i>Loranthus Collettii</i>	3	3,800	..	Assamo-burmese.
.. PULVERULENTUS	3	4 2,000—6,200	Terai—4,000	Himalayo-burmese.
.. sp.	4	2,000	..	..
<i>Balanophora dioica</i>	3	4 700—3,200	4,000—9,000	Assamo-burmese.
<i>Rhopalocnemis phalloides</i>	4	4,100	6,000—8,000	Assamo-malayan.
BRIDELIA ASSAMICA	1	..	..	plains	Terai—3,000	E. Himalayan.
.. STIPULARIS	4	1,000	Terai—1,200	Indo-malayan.
<i>Actephila neilgherrensis</i>	3	4 600—1,000	..	Indo-burmese.
<i>Andrachne emicans</i>	1	..	4	plains—800	..	Endemic.
PHYLLANTHUS BREVIPES	3	4 600—1,300	..	Endemic.
.. <i>Clarkei</i>	1	..	3	4 plains—900	6,000	Assamese.
<i>Glochidion mishmiense</i>	4	2,500	..	Endemic.
SAUROPEUS ANDROGYNUS	3	1,400	1,000—5,000	Indo-malayan.
.. MACROPHYLLUS	4	900	..	Assamese.
BISCHOFIA JAVANICA	..	2	3	4 600—1,000	2,000—3,000	Indo-malayan.
BACCAUREA SAPIDA	1	..	3	.. plains—1,400	2,000	Assamo-malayan.
JATROPHA CURCAS	1	..	..	plains	Terai—2,000	intruder.
CROTON CAUDATUS	4	900	Terai—4,500	Indo-malayan.
.. sp.	3	2,400	..	..
<i>Ostodes paniculata</i>	4	3,600	2,000—5,000	Assamo-burmese.
CLAOXYLON KHASIANUM	3	2,400	..	Assamese.
MALLOTUS ALBUS	3	4 600—3,600	1,000—3,000	Indo-burmese.
.. sp.	3	1,500	..	..
<i>Cleidion javanicum</i>	3	4 700—1,000	2,000—4,000	Indo-malayan.
MACARANGA DENTICULATA	3	4 600—1,400	Terai—5,000	Assamo-malayan.
.. <i>pustulata</i>	4	900—1,000	Terai—6,000	Himalayan.
HOMONIA RIPARIA	1	2	3	4 plains—900	Terai—1,000	Indo-malayan.
<i>Baliospermum calycinum</i>	3	700	..	Assamese.
<i>Euphorbiacea</i>	..	1	2	.. plains	..	..
<i>Euphorbiacea</i>	3	1,500	..	..
<i>Euphorbiacea</i>	4	2,800	..	..
<i>Ulmus lancifolia</i>	3	4 600—800	1,000—4,500	Himalayo-burmese.
CELTIS TETRANDBRA	..	2	3	.. 500—700	Terai—2,500	Indo-malayan.
.. <i>trinervia</i>	3	4 2,500—4,800	Terai—4,000	..
.. sp.	..	2	..	600	..	..
TREMA ORIENTALIS	3	4 800—3,500	Terai—2,000	Assamo-malayan.

	ABOR-LAND.				Sikkim.	Distribution
	Zones.		Height.			
MORUS LAEVIGATA	2	..	..	600	Terai—4,000	Himalayo-burmese.
„ INDICA	1	..	3	plains—1,400	Terai—4,000	Himalayo-chinese.
FICUS GIBBOSA	3	..	..	1,500	Terai	Indo-malayan.
„ mysorensis	2	..	..	600	Terai—2,000	Indo-burmese.
„ Hookeri	2	3	4	600—2,500	2,000—7,000	Assamese.
„ glaberrima . . . . .	..	..	..	4 900—2,400	1,000—2,000	Assamo-malayan.
„ OBTUSIFOLIA	1	..	..	plains	Terai	Assamo-malayan.
„ elastica	1	..	3	plains—2,400	Terai—5,000	Assamo-malayan.
„ Benjamina . . . . .	..	..	..	4 600—900	Terai—3,000	Indo-malayan.
„ NERVOSA . . . . .	..	..	..	3 4 600—1,200	Terai—3,500	Indo-malayan.
„ HETEROPHYLLA	1	..	..	plains	Terai	Indo-malayan.
„ OBCURA . . . . .	..	..	..	4 800—900	1,500—5,000	Assamo-malayan.
„ sikkimensis	2	..	..	4 600—900	1,000—4,000	Assamese.
„ HISPIDA . . . . .	..	..	..	4 3,400	Terai—3,000	Indo-malayan.
„ prostrata	1	..	..	plains	1,500—4,000	Assamese.
„ CUNIA	1	2	3	4 plains—3,800	Terai—2,500	Himalayo-malayan.
„ FISTULOSA . . . . .	..	..	..	4 1,000 . . . . .	..	Assamo-malayan.
„ SCANDENS . . . . .	..	..	..	3 6,200	800—2,000	Himalayo-burmese.
„ foveolata . . . . .	..	..	..	3 2,400	2,000—7,000	Himalayo-malayan.
„ HIRTA . . . . .	..	..	..	4 700—3,400	Terai—2,600	Assamo-malayan.
„ SILHETENSIS	1	..	..	plains . . . . .	..	Assamese.
„ PYRIFORMIS . . . . .	..	..	..	3 4 600—900 . . . . .	..	Assamo-burmese.
„ nemoralis . . . . .	..	..	..	3 1,000—2,400	1,800—6,500	Himalayo-burmese.
„ ROXBURGHII . . . . .	..	..	..	3 4 600—1,800	1,000—5,000	Assamo-burmese.
„ POMIFERA	1	..	..	4 plains—4,000	800—3,000 .	Assamo-malayan.
CUDRANIA JAVA-NENSIS	1	..	..	4 plains—1,000	Terai—5,000	Indo-malayan.
ARTOCARPUS CHAP-LASHA . . . . .	..	2	..	.. 600	Terai—3,000	Assamo-burmese.
CONOCEPHALUS SUAVEOLENS	1	..	3	4 plains—2,300	Terai—3,000	Assamo-malayan.
Urtica parviflora	1	..	..	4 plains—900	900—12,000	Himalayo-malayan.
LAPORTEA CRENULATA	1	2	3	4 plains—2,700	Terai—5,000	Indo-malayan.
GIRARDINIA HETERO-PHYLLA	1	..	3	4 plains—3,600	5,000—7,000	Indo-malayan.
PILEA insolens . . . . .	..	..	..	4 800—3,000 . . . . .	..	Endemic.
„ SMLACIFOLIA . . . . .	..	..	..	3 4 600—4,700	Terai—7,000	Assamo-malayan.
„ symmeria . . . . .	..	..	..	3 4 900—3,500	6,000—12,000	Himalayo-chinese.
„ BRACTEOSA . . . . .	..	..	..	4 2,000—3,600	1,000—9,000	Assamo-burmese.
„ scripta	1	..	..	4 plains—3,800	2,000—10,000	Himalayo-burmese.
Lecanthus peduncularis . . . . .	..	..	..	3 4 1,400—3,000	6,000—10,000	Indo-malayan.
ELATOSTEMA SESSILE	1	..	..	4 plains—3,400	7,000—9,000	Indo-malayan.
„ lineolatum . . . . .	..	2	3	4 600—2,300	1,900—3,000	Indo-chinese.
„ Hookerianum . . . . .	..	..	..	3 4 2,300—6,200	6,000—8,000	..
„ dissectum . . . . .	..	..	..	3 4 1,000—5,500	5,500—8,000	E. Himalayan.
„ papillosum . . . . .	..	..	..	3 4 1,000—5,700 . . . . .	..	Assamese.
„ decipiens . . . . .	..	..	..	4 2,000—4,700 . . . . .	..	Assamese.
„ MacIntyreii . . . . .	..	..	..	3 2,400 . . . . .	..	Endemic.
„ arcuans . . . . .	..	..	..	4 1,300 . . . . .	..	Endemic.
„ imbricans . . . . .	..	..	..	3 5,100—6,200 . . . . .	..	Endemic.
„ acuminatum . . . . .	..	..	..	4 4,700	7,000	Indo-malayan.

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.		Height.			
<i>ELATOSTEMA</i>						
„ <i>platyphyllum</i>	2	3	4	600—3,400	2,500	Himalayo-assamese.
„ sp.	..	..	4	1,000	..	..
<i>BOEHMERIA malabarica</i>	2	..	..	600	Terai—5,000	Indo-malayan.
„ <i>macrophylla</i>	..	3	4	700—1,500	800—1,000	Himalayo-burmese.
„ <i>PLATYPHYLLA</i>	1	..	..	plains	900—8,000	Old World.
<i>POUZOLZIA sanguinea</i>	2	3	4	600—800	Terai—8,000.	Himalayo-malayan.
„ <i>pentandra</i>	1	..	..	plains	Terai	Indo-malayan.
„ <i>HERTA</i>	..	..	4	1,000	Terai—7,000	Himalayo-malayan.
<i>Smithiella myriantha</i>	..	..	4	800—1,000	..	Endemic.
<i>SARCOCHLAMYS PULCHERRIMA</i>	1	..	..	plains	..	Assamo-malayan.
<i>DEBREGEASIA LONGIFOLIA</i>	1	..	..	plains	2,000—6,000	Indo-malayan.
<i>VILLEBRUNIA INTEGRIRIMA</i>	..	2	3	600—1,000	2,000—5,000	Indo-malayan.
„ <i>rubescens</i>	1	..	..	plains	..	Himalayo-malayan.
<i>Engelhardtia spicata</i>	..	3	4	2,800—3,600	900—6,000	Himalayo-malayan.
<i>Betula alnoides</i>	..	..	4	700—900	2,000—10,000	Himalayo-chinese.
<i>QUERCUS SEMISERRATA</i>	..	3	4	800—4,000	..	Assamo-malayan.
„ <i>lappacea</i>	2	3	4	600—2,300	..	Assamo-burmese.
„ <i>pachyphylla</i>	..	3	..	5,000	6,000—10,000	Assamo-burmese.
„ <i>DEALBATA</i>	..	3	..	5,800—6,200	..	Assamo-burmese.
„ <i>lanceaeifolia</i>	..	3	4	900—6,200	Terai—5,000	Assamo-burmese.
„ <i>xylocarpa</i>	..	3	4	4,000—5,600	..	Assamo-burmese.
„ <i>Rex</i>	1	3	..	plains—2,500	5,000—8,000	Assamo-burmese.
„ <i>Listeri</i>	..	3	4	900—2,500 or ? 6,200.	..	Assamese.
„ sp.	..	..	4	800	..	..
„ sp.	..	3	..	2,400	..	..
„ sp.	..	..	4	3,800—3,900	..	..
<i>CASTANOPSIS INDICA</i>	1	3	..	plains—2,000	700—6,000	Assamo-burmese.
„ <i>Hystrix</i>	..	3	..	1,500—4,800	7,000—8,000	Assamo-burmese.
„ sp.	..	..	4	1,300—3,800	..	..
„ <i>castanicarpa</i>	..	3	..	1,400—2,000	..	Assamo-chinese.
„ <i>TRIBULOIDES</i>	1	3	4	plains—5,100	5,000—7,000	Himalayo-burmese.
<i>SALIX TETRASPERMA</i>	1	..	..	plains	Terai—3,000	Indo-malayan.
<i>Populus ciliata</i>	..	3	..	2,000—2,300	6,000—10,000	Himalayan.
<i>CERATOPHYLLUM DEMERSUM</i>	1	3	..	plains—5,500	..	World.
<i>Cephalotaxus Griffithii</i>	..	..	4	2,000—2,600	..	Assamo-burmese.
<i>PODOCARPUS NERIIFOLIA</i>	..	3	4	2,300—4,000	3,000—4,000	Assamo-burmese.
<i>OBERONIA FALCONERI</i>	..	..	4	800—900	..	Indo-burmese.
<i>LIPARIS bituberculata</i>	..	..	4	3,300	5,000—7,000	Himalayo-assamese.
„ <i>LONGIPES</i>	1	..	..	plains—900	1,000—5,400	Indo-malayan.
„ <i>viridiflora</i>	..	..	4	3,200	4,000—6,000	Assamo-malayan.
<i>DENDROBIUM ACINACIFORME</i>	..	..	4	800—900	..	Assamese.
„ <i>nobile</i>	1	..	..	plains	Terai—1,700	Assamo-chinese.
„ <i>MOSCHATUM</i>	1	..	..	plains	2,000—6,000	Himalayo-burmese.
<i>Bulbophyllum reptans</i>	..	3	..	5,100	6,000—7,000	Assamo-burmese.
<i>Eria muscicola</i>	..	3	..	2,400	4,000—5,000	Indo-burmese.

	ABOR-LAND.		Sikkim.	Distribution.
	Zones.	Height.		
<i>Eria stricta</i>	3	700—1,600	1,000—4,000	Assamo-burmese
„ <i>clavicaulis</i>	3	3,800—4,900	..	Assamese.
„ <i>flava</i>	2	600	1,000—5,000	Assamo-burmese
ACANTHEPHIPIUM SYL- HETENSE	2 3	? 600	2,000—4,000	Assamo-burmese.
PACHYSTOMA SENILE	1 2	plains	Terai	Indo-burmese.
CERATOSTYLIS TERES	3 4	700—1,000	3,000—4,000	Assamo-malayan.
Coelogyne ovalis	3	700	2,000—6,000	Himalayo- Assamese.
Otochilus alba	3	4,800	3,000—5,000	Assamo-burmese.
„ <i>fusca</i>	3	5,100	4,000—6,000	Assamo-burmese.
PHOLIDOTA IMBRICATA	1 3 4	plains—700	1,000—4,000	Indo-malayan.
Calanthe biloba	4	3,800	3,000—7,000	Assamo-burmese.
„ <i>alismaefolia</i>	1	plains	Terai—7,000	Himalayo- assamese.
„ <i>angusta</i>	1 ●	plains	..	Endemic.
Eulophia sp.	1	plains	..	..
Cymbidium sp.	4	900	..	..
Geodorum purpureum	4	1,000	Terai	Indo-malayan.
LUISIA INCONSPICUA	2 3 4	6,000—1,000	1,000—4,000	Assamese.
PHALANOPSIS MANNII	1	plains—2,000	1,000	Assamese.
„ <i>PAIISHII</i>	2	600	Terai—1,500	Assamo-burmese.
Sarcochilus sp.	3	2,400	..	..
VANDA TERES	1	plains	Terai—1,000	Assamo-burmese.
„ <i>bicolor</i>	4	1,300	..	..
SARCANTHUS SUBULATUS	1 3 4	plains—1,300	Terai—1,000	Assamese.
Tropidia angulosa	1 3	plains—700	1,000—2,000	Indo-burmese.
Spilanthes australis	1 3	plains—600	Terai—8,000	Indo-malayan.
Zeuxine goodyeroides	4	3,700	6,000—8,000	Assamo-burmese.
GOODYERA PROCERA	3	600	1,000—4,000	Indo-malayan.
„ <i>grandis</i>	1	plains	4,000	E. Himalayan.
„ <i>hispidula</i>	3 4	700—4,700	1,000	Assamese.
Hetaeria rubens	2 3	600—2,300	1,500	Assamo-burmese.
Pogonia sp.	1	plains	..	..
Globba multiflora	1 3	plains—700	..	Assamo-burmese.
CURCUMA LONGA	1	plains	Terai—3,500	..
„ <i>AMADA</i>	1	plains	Terai	..
„ <i>sp.</i>	1	plains	..	..
„ <i>sp.</i>	1	plains	..	..
„ <i>sp.</i>	1	plains	..	..
HITCHENIA CAREYANA	3 4	600—900	..	Assamese.
HEDYCHUM VILLOSUM	3	2,400—3,000	..	Assamese.
„ <i>gardnerianum</i>	1	plains	3,000—7,000	E. Himalayan.
„ <i>stenopetalum</i>	3 4	700—3,500	..	Assamo-burmese.
„ <i>sp.</i>	3 4	900—2,500	..	..
AMOMUM DEALBATUM	1 3 4	plains—3,800	Terai—3,500	Assamo-burmese.
ZINGIBER ROSEUM	2	600	..	..
COSTUS SPECIOSUS	1 2	plains	Terai—1,000	Indo-malayan.
ALPINIA ALLUGHAS	1 2 3 4	plains—1,300	Terai—1,000	Indo-malayan.
„ <i>MALACCENSIS</i>	1 3 4	plains—1,800	Terai—4,500	Indo-malayan.
PHRYNUM CAPITATUM	1 2 3 4	plains—2,000	Terai—900	Indo-malayan.
„ <i>PARVIFLORUM</i>	3	700	2,000	Indo-malayan.
MUSA AURANTIACA	1	plains—1,600	..	Assamese.
„ <i>velutina</i>	1	plains	..	Endemic.
„ <i>pruinosa</i>	2 3 4	600—3,500	..	E. Himalayan.
„ <i>paradisiaca</i>	2 3 4	600—3,600	..	..
PELIOSANTHES MACRO- PHYLLA	3 4	900—6,200	3,000—6,000	E. Himalayan.
„ <i>VIOLACEA</i>	3 4	1,200—5,500	..	Assamo-malayan.
„ <i>Baker</i> . . . . .	..	2,400	1,300—6,000	Assamo-burmese.

			ABOR-LAND.		Sikkim.	Distribution.			
	Zones.		Height.						
<i>Ophiopogon wallichianus</i>	3	..	4,400—5,100	6,000—11,000	Himalayo-burmese.		
.. <i>intermedius</i>	4	1,400—1,600	5,000—10,000	Indo-malayan.	
<i>AGAVE VERA-CRUZ</i>	1	..	..	plains	Terai—3,000	intruder.	
<i>Belamcanda chinensis</i>	1	..	3	plains—(1,400)	..	Assamo-chinese.	
<i>CURCULIGO GRANDIS</i>	3	..	3	700	..	Assamese.	
.. <i>RECURVATA</i>	3	4	600—3 600	..	1,000—5,000	Indo-malayan.	
<i>TACCA LAEVIS</i>	3	4	600—2,700	..	..	Assamo-malayan.	
<i>DIOSCOREA PRAZERI</i>	3	..	700	..	Terai—4,500	Assamo-burmese.	
.. <i>BULBIFERA</i>	1	..	..	plains	..	Indo-pacific.	
.. <i>PENTAPHYLLA</i>	1	..	4	plains—1,000	Terai—5,000	Indo-pacific.	
.. <i>ANGUINA</i>	1	..	..	plains	Terai—3,000	Indo-malayan.	
.. sp.	3	4	1,400—(3,000)	..	..	..
.. <i>WATTII</i>	1	..	3	4	plains—2,500	Terai—2,000	Assamese.
.. <i>LEPCHARUM</i>	1	..	3	4	plains—2,000	Terai—3,000	Assamo-burmese.
.. sp.	1	..	4	plains—2,500	..	..
.. <i>GLABRA</i>	1	..	..	plains	Terai—1,500	Himalayo-burmese.	
.. sp.	3	4	700—2,000	..	..	Assamese.	
<i>Stemona tuberosa</i>	1	..	4	plains—2,000	..	Assamo-chinese.	
<i>Smilax parvifolia</i>	4	4,400—5,500	5,000—7,000	Himalayo-assamese.	
.. <i>odoratissima</i>	3	4	800—4,500	..	1,000—6,000	Assamo-malayan.	
.. <i>lanceaefolia</i>	3	4	2,000—4,000	..	3,000—7,000	Assamo-burmese.	
.. <i>quadrata</i>	4	2,400	..	Assamo-burmese.	
.. <i>megacarpa</i>	1	..	4	plains—3,600	..	Assamo-malayan.	
.. <i>Griffithii</i>	4	2,800	..	Endemic.	
<i>Heterosmilax indica</i>	1	..	..	plains	5,500	Assamo-burmese.	
<i>Polygonatum brevistylum</i>	3	..	3	5,100	7,000—8,000	E. Himalayan.	
.. <i>oppositifolium</i>	3	..	3	6,200	1,800—11,000	Assamo-burmese.	
.. <i>Cathcartii</i>	3	..	3	6,200	8,000—10,000	Assamese.	
<i>Tovaria</i>	3	..	3	6,200	5,000—11,000	Assamese.	
<i>Tupistra Clarkei</i>	4	900—3,300	2,000—5,000	E. Himalayan.	
.. <i>veratrifolia</i>	3	..	3	600—800	..	Assamese.	
<i>PLEOMELE ANGSTIFOLIA</i>	1	..	3	4	plains—3,500	..	Assamo-malayan.
.. <i>PETIOLATA</i>	1	..	4	plains—900	..	Endemic.	
<i>Disporum pullum</i>	3	4	400—3,300	..	5,000—7,500	Himalayo-malayan.	
<i>Paris polyphylla</i>	3	4	3,200—5,000	..	5,000—12,000	Himalayo-burmese.	
<i>POLLIA ACLISIA</i>	3	4	2,400—4,100	..	2,000—3,000	Assamo-malayan.	
.. <i>SUBUMBELLATA</i>	1	2	3	4	plains—3,600	Terai—6,000	Assamese.
<i>COMMELINA OBLIQUA</i>	1	..	3	4	plains—1,000	Terai—7,000	Indo-malayan.
<i>ANEILEMA MALABARICUM</i>	1	plains	..	Terai—6,000	Indo-malayan.
<i>FORRESTIA HOOKERI</i>	1	..	3	..	plains—2,400	Terai—4,700	Assamese.
.. <i>GLABRATA</i>	1	plains	..	1,000—4,000	Assamo-malayan.
<i>Streptolirion volubile</i>	3	4	2,700—4,800	..	3,000—9,000	Himalayo-chinese.	
<i>FLOSCOPA SCANDENS</i>	4	1,000	..	Terai—5,000	Indo-malayan.
<i>JUNCUS BUFONIUS</i>	1	plains	..	7,000—8,000	World.
<i>PINANGA GRACILIS</i>	1	2	3	4	plains—3,000	2,000—3,000	Assamo-burmese.
.. sp.	1	2,000
<i>WALLICHIA DENSIFLORA</i>	3	4	700—3,700	..	1,000—6,000	Himalayo-assamese.	
<i>Arenga pinnata</i>	1	2	3	4	plains—3,400	..	Assamo-malayan.
<i>CARYOTA URENS</i>	1	plains	..	1,000—5,000	Indo-malayan.
<i>LIVISTONA JENKINSIANA</i>	3	4	1,000	..	Terai	..	Assamese.
<i>CALAMUS erectus</i>	2	3	4	600—4,700	..	Terai—4,000	Assamo-burmese.
.. <i>FLAGELLUM</i>	3	1,400—1,600	..	Terai—4,000	Assamo-burmese.

	ABOR-LAND.				Sikkim.	Distribution.	
	Zones.		Height.				
CALAMUS							
" leptospadix	1	2	3	..	plains—700 .	Terai—4,000	Assamo-burmese.
" FLORIBUNDUS	1	..	..	..	plains . . . . .	..	Assamese.
" sp. . . . .	..	..	3	..	5,400—6,200	..	..
" ACANTHOSPATUS . . . . .	..	..	3	..	2,800—5,400	Terai—5,000	Assamo-burmese
" GRACILIS . . . . .	..	2	3	4	plains—5,100	..	Assamese.
Pandanus . . . . .	..	2	3	4	600—5,100	..	..
Arisaema petiolulatum . . . . .	..	..	3	4	2,300 . . . . .	..	Assamese.
" Listei . . . . .	..	..	3	..	2,300—4,200	..	E. Himalayan.
" tortuosum . . . . .	..	..	3	..	5,500	2,000—9,000	Indo-burmese.
" concinnum . . . . .	..	..	3	4	1,300—2,300	6,000—10,000	Himalayo-assamese.
TYPHONIUM TRILOBATUM	1	..	..	..	plains . . . . .	..	Indo-malayan.
AMORPHOPHALLUS BULBIFER . . . . .	..	..	3	4	3,000—3,500	Terai—3,000	Indo-burmese.
Stuednera discolor . . . . .	..	..	..	4	1,000 . . . . .	..	Endemic.
" capitellata . . . . .	..	..	3	4	1,400—4,000	..	Assamo-burmese
COLOCASIA ESCULENTUM	1	..	3	4	600—3,600	Terai—3,000	..
" MANNII	1	..	..	..	plains . . . . .	..	..
ALOCASIA FALLAX	1	2	3	4	plains—3,200	2,000—4,500	Assamo-burmese
Aglaiionema Hookerianum . . . . .	..	..	3	4	600—2,000 . . . . .	..	Assamese.
Scindapsus sp. . . . .	..	..	3	..	700—4,000 . . . . .	..	..
RHAPHIDOPHORA GRANDIS . . . . .	..	..	3	4	700—6,200	4,000—6,800	Himalayo-assamese.
" HOOKERI	1	2	3	4	plains—1,400	900—6,000	Assamo-burmese
" decursiva . . . . .	..	..	..	4	1,200	2,000—6,800	Indo-burmese.
" glauca	1	2	..	..	plains	4,000—7,000	Assamo-burmese
LASIA SPINOSA	1	2	..	..	plains	Terai	Assamo-malayan
POTHOS SCANDENS . . . . .	..	..	3	..	2,400	Terai—4,000	Indo-malayan.
" Cathcartii . . . . .	..	2	..	..	600	Terai—3,000	Himalayo-burmese.
" vriesianus	1	2	3	..	plains—2,400	1,000—4,000	Assamo-burmese
Lemna sp.	1	..	..	..	plains . . . . .	..	..
WOLFFIA MICHELII	1	..	..	..	plains . . . . .	..	World.
LOPHOTOCARPUS GUIANENSIS	1	..	..	..	plains	Terai	Indo-malayan.
KYLLINGIA BREVI-FOLIA . . . . .	..	..	3	4	900—3,100	Terai—4,500	World.
PYREUS GLOBOSUS . . . . .	..	..	..	4	900	Terai—9,000	Old World
CYPERUS NIVEUS	1	..	..	..	plains	Terai—6,500	Himalayo-chinese.
" DIFFUSUS . . . . .	..	..	..	4	900—1,600	700—3,000	Pantropic.
MARISCUS SIEBERIANUS	1	..	..	..	plains	Terai—5,000	Pantropic
FIMBRISTYLIS DIPHYLLA . . . . .	..	..	..	4	700	Terai—5,500	Pantropic.
" JUNCIFORMIS	1	2	..	..	plains—5,500	..	Indo-malayan
SCIROPUS setaceus	1	..	..	..	plains	Terai—13,000	Old World.
" TERNATENSIS . . . . .	..	..	3	..	2,400	3,000—6,000	Himalayo-chinese.
SCLERIA ELATA . . . . .	..	..	3	4	600—3,800	Terai—2,000	Indo-malayan.
Carex Thomsoni	1	..	..	4	plains—800	Terai—2,000	Himalayo-chinese.
" rara . . . . .	..	..	..	4	5,500	1,000—13,000	Indo-malayan.
" cruciata . . . . .	..	..	3	4	600—2,000	4,000—8,000	Assamo-malayan.
" filicina . . . . .	..	..	3	..	4,700	4,000—10,000	Indo-malayan.
" baccans . . . . .	..	..	..	4	1,300	4,000—8,000	Indo-malayan.
" composita . . . . .	..	..	..	4	5,500 . . . . .	..	Assamese.
" insignis . . . . .	..	..	..	4	1,600	5,000—7,000	Assamese.
PASPALUM CONJUGATUM . . . . .	..	..	3	4	700—1,500	Terai—2,000	Pantropic

	ABOR-LAND.				Sikkim.	Distribution.
	Zones.	Height.				
ISACHNE ALBENS	3	4	3,800—5,700	4,000—9,000	Himalayo-malayan.	
PANICUM CRUS-GALLI	1	..	..	plains . . .	Terai—3,500	Pantropic.
.. INDICUM . . . . .	..	..	..	4 2,000—3,800	Terai—4,000	Indo-malayan.
.. INCISUM	1	..	..	plains . . .	..	Assamese.
.. SARMENTOSUM	1	..	..	plains . . .	..	Indo-malayan.
.. PPLICATUM	1	..	3 4	plains—4,700	Terai—6,400	Indo-malayan.
.. PILIPES . . . . .	..	..	3	600—700	Terai.	Indo-malayan.
.. UNCINATUM	1	..	..	plains . . .	900—6,000	Indo-malayan.
ICHNANTHUS PALLENS . . . . .	..	..	3	1,600—4,700	Terai—3,500	Pantropic.
THYSANOLAENAMAX IMA . . . . .	..	..	3 4	600—900	Terai—1,200	Indo-malayan.
OPLISMENUS COMPO- SITUS	1	..	3 4	plains—3,000	900—8,000	Pantropic.
Arundinella intricata . . . . .	..	..	4	700—900	Terai?	Assamese.
.. WALLICHII . . . . .	..	..	4	900 . . .	1,000—6,000	Himalayo-bur- mese.
SETARIA GLAUCA . . . . .	..	..	4	600—1,500	Terai—4,000	Pantropic.
COIX LACHRYMAJOBI IMPERATA ARUNDI- NACEA	1	..	4	plains—900 .	..	Pantropic.
Miscanthus nepalensis . . . . .	..	..	3	600—2,000	6,000—9,000	Himalayo- chinese.
SACCHAREM ARUNDINA- CEUM	1	..	3 4	plains—2,000	Terai—2,500	Indo-malayan.
ISCHAEMUM RUGOSUM	1	..	..	plains . . .	Terai—1,000	Indo-malayan.
POGONATHERUM SAC- CHAROIDEUM . . . . .	..	..	3 4	600—900	900-5,000	Indo-malayan.
ARTHRAOXON RUDIS	1	..	..	plains . . .	..	Indo-assamese.
ANDROPOGON ASSIM- ILIS	1	2	3 4	..	Terai—6,000	Indo-malayan.
.. ZIZANIOIDES	1	..	..	plains . . .	..	Indo-malayan.
.. ACICULARIS	1	..	..	4 plains—1,300	Terai . . .	Indo-malayan.
TREMEDA GIGANTEA . . . . .	..	..	4	700—3,300	Terai . . .	Indo-malayan.
Garnotia stricta . . . . .	..	..	4	1,000—1,200	2,000—6,000	Indo-burmese.
POLYPOGON MONS- PELIENSE	1	..	..	plains . . .	..	Pantropic.
SPOROBOLUS DIAN- DER	1	..	..	plains . . .	..	Indo-malayan.
.. INDICUS . . . . .	..	..	4	800—1,500	Terai—2,500	Pantropic.
CYNODON DACTYLON	1	..	..	4 plains—900 .	Terai—4,000	Pantropic.
ELEUSINE INDICA	1	..	..	plains . . .	Terai—5,000	Old World.
PHRAGMITES KARKA	1	2	..	4 plains—2,000	Terai—1,000	Indo-malayan.
TETRAPHRIS MADAGASCAR- ENSIS . . . . .	..	..	3 4	700—2,000	Terai—4,000	Old World.
ERAGROSTIS AMABILIS	..	..	4	..	Terai—4,000	Indo-malayan.
CENTOTHECALAPPACEA . . . . .	..	..	4	800—1,400	Terai—4,000	Indo-malayan.
Arudinaria Griffithiana . . . . .	..	..	3	6,200 . . .	4,000 . . .	Assamese.
.. Mannii . . . . .	..	..	3 4	1,200—5,100	..	Assamese.
BAMBUSA PALLIDA . . . . .	..	..	3	700 . . .	600—3,000	Assamo-burmese
DENDROCALAMUS HAMIL- TONII . . . . .	..	..	3 4	600—4,600	Terai . . .	Himalayo- burmese.
.. Hookeri . . . . .	..	2	3 4	600—(1,400)	4,500—5,000	Assamo-burmese.
PSEUDOSTACHYUM POLY- MORPHUM	1	..	..	plains . . .	1,500—6,000	Assamo-burmese.
Cephalostachyum Fuchsi- anum . . . . .	..	..	4	3,800 . . .	6,000—3,000	Assamo-burmese.
Dinochloa McClellandi . . . . .	..	..	3	4,600 . . .	..	Assamo-burmese.
Gramina † . . . . .	..	..	4	5,500 . . .	..	..

PART IV.

Some Analyses (Spermatophyta only) based on the statement of Distribution in the Eastern Himalaya made in Part III.

I have said above that I endeavoured to collect all the Spermatophytes within the area that I was able to visit. I am going to assume that the result gives a fair representation of the Flora of my limited area, and to discuss its geographic relationships. The discussion must extend to the origin of related Floras in other parts of India.

Hill-species descend lower in Abor-land than in Sikkim.

One of the obvious conclusions that can be drawn from Table I making Part III, is that in Abor-land species descend lower than in Sikkim; for instance there are in that Table 231 species recorded as having their lower Abor-land limit at least 300 feet below their lower Sikkim limit; in 76 of them the difference ranges between 300 and 1,000 feet, in 73 it ranges between 1,000 and 2,000 feet, and in 82 the difference is still greater. On the other hand, there are records of species attaining lower levels in Sikkim than in the Abor mountains, but fewer and much out-numbered by the other group. Everyone will admit that the presence of the following species in the plains of Sadiya is of interest:—*Viola glaucescens*, *Actinidia callosa*, *Rhus semialata*, *Prunus acuminata*, *Rubus lasiocarpus*, *Rubus rosaefolius*, *Potentilla kleiniana*, *Melothria perpusilla*, *Gynostemma pedatum*, *Alsomitra clavigera*, *Macropanax undulatum*, *Sambucus javanica*, *Gnaphalium luteo-album*, *Lysimachia japonica*, *Trachelospermum fragrans*, *Marsdenia tinctoria*, *Ehretia wallichiana*, *Ipomaea Kingii*, *Curanga fel-terrae*, *Veronica javanica*, *Thunbergia coccinea*, *Plectranthus Coetsa*, *Elshotzia blanda*, *Plantago major*, *Polygonum Posumbu*, *Polygonum capitatum*, *Houttuynia cordata*, *Chloranthus officinalis*, *Phyllanthus Clarkei*, *Baccaurca sapida*, *Pilea scripta*, *Elatostema sessile*, *Debregeasia longifolia*, *Castanopsis tribuloides*, *Dendrobium moschatum*, *Goodyera grandis*, *Hedychium gardnerianum*, *Heterosmilax indica*, *Juncus bufonius*, *Pinanga gracilis*, *Alocasia fallax*, and *Rhaphidophora glauca*.

The intercalation of dry months into the circle of the year is the chief climatic factor in forbidding this descent elsewhere.

To illustrate the climatic peculiarity of the plains of upper Assam in regard to humidity, I give here, in a series, the annual averages of the relative humidity at stations on the plains of northern India, and underneath them the number of months in the year wherein the monthly average

at these stations fails to attain 86, which is the *minimum* monthly average of relative humidity for the recording stations of the top of Assam.

	Roorkee, Lat. 77°53'E	Gorakhpur, Lat. 83°22'E	Darbhanga, Lat. 85°54'E	Purnea, Lat. 87°28'E	Dhubri, Lat. 89°59'E	Tezpur, Lat. 92°47'E	Bishnath, Lat. 93° 10'E	Doom-Dooma, Lat. 95°33'E
Ann. Average Relative Humidity. .	71	75	81	85	87	89	93	93
No. of months when it is below 86 .	12	10	7	4	3	2	2	0

I have given the annual averages of relative humidity for comparative purposes, but I believe that it is the intercalated dry months, which keep the plants just listed from existing in the plains west of Assam, and seasonal differences corresponding within the Himalaya, that are the limiting factor to the downward extension in the Sikkim-Himalaya of many species, which descend lower in Abor-land.

Local and General Distribution in Abor-land.

Out of the species of the Spermatophyta, in Zone 1 :—

- 156 were there only.
- 18 were in that Zone, and extending to Zone 2, but not beyond.
- 15 more passed from Zone 1 through Zone 2 to Zone 3.
- 47 were observed in all the Zones.

236

further,

- 6 were found common to Zones 1, 2 and 4.
- 66 to Zones 1, 3 and 4.

308

and again,

- 43 were found common to Zones 1 and 4.
- 33 to Zones 1 and 3.

384 species in all.

Out of the species of the Spermatophyta, in Zone 2 :—

- 28 were there only,
 18 (as recorded under Zone 1) were common to Zones 2 and 1, making

 46 which were not found to penetrate the hills
 19 were found to be common to Zones 2 and 3,
 35 to be common to Zones 2, 3 and 4, and
 4 to Zones 2 and 4, making a total of 58 which appear as Hill-plants
 able to extend onto the fringe of the Plain

 104 and to these are to be added :—
 15 common to Zones 1, 2 and 3,
 6 to Zones 1, 2 and 4
 47 to all the Zones

 172 species in all.

Out of the species of the Spermatophyta, in Zone 3 :—

- 195 were there only,
 185 were found common to Zones 3 and 4, making

 380 species which appear as Hill-plants
 19 (as recorded) were common to Zones 3 and 2,
 35 to Zones 4, 3 and 2, making

 434 species which fail to reach the centre of the Plains.
 33 were found common to Zones 3 and 1.
 15 to Zones 1, 2 and 3,
 66 to Zones 1, 3 and 4,
 47 to all Zones.

 595 species in all

Out of the species of the Spermatophyta, in Zone 4 :—

- 167 were there only,
 185 were found in Zones 3 and 4, making

 352 species which appear as Hill-plants.
 35 were common to Zones 4, 3 and 2
 4 to Zones 4 and 2, making

 391 species which, from the Hills, fail to appear in Zone 1.
 43 were common to Zones 4 and 1, as if avoiding the wettest intermediate Zones.
 6 to Zones 4, 2 and 1
 66 to Zones 4, 3 and 1
 47 to all the Zones.

 553 species in all.

The result of these analyses is that out of the Spermatophyta occurring wild :—

- 202 species appear as Plains species, because they are not found to penetrate into the Hills at all ;
- 547 appear as Mountain plants because they were not observed upon the Plains at all ;
- 67 appear as Mountain plants able to occupy the skirt of the Hills ;
- 43 common to Zones 1 and 4, but absent between, appear as if to avoid the intense humidity of the intermediate Zones ;
- 19 common to Zones 2 and 3, but absent in the other two, appear to thrive where the humidity is intensest ; and adding to them the 28 restricted to Zone 2 and the 195 restricted to Zone 3, a total is obtained of 242 species being those most favoured by humidity.

Herbaceous and woody plants.

The wild phanerogamic flora, as enumerated, is found on analysis to contain 430 herbaceous and 589 woody species. Towards the centre of the Assam Plain, that is to say in Zone 1, the herbs make 50 per cent. of the species present : but in the dense even forest of Zone 2, they make only 25 per cent.—a sharp contrast. This percentage is increased to 36 in Zone 3, and to 44 in Zone 4.

In the tropics, as a consequence of the absence of winter, annuals do not constitute a group of such clear definiteness as in temperate regions ; and it is difficult to decide exactly what can be called an annual and what cannot be so-called : in this difficulty I have selected out of the whole flora 49 species which are undoubtedly short-lived, and have ascertained their distribution by Zones ; they make 9 per cent. of the species in Zone 1 ; 3 per cent. of the species in Zone 2 ; 2 per cent. of the species in Zone 3 ; and 4.5 per cent. of the species in Zone 4. Why ?—because they are for the most part weeds of cultivation, favoured by the more permanent occupation of the land by man, so that for instance no less than 34, or 69 per cent. of them extend to the centre of the plains of Bengal.

Percentage of these annual plants which reach the centre of the plains of Bengal	..	..	..	..	69
Percentage of other herbaceous plants	..	..	..	..	26
Percentage of woody plants	..	..	..	..	14

This is a little testimony to the really enormous influence of man upon the vegetation of the world.

Among the herbaceous plants there are 5, which cannot grow out of water ; they are found chiefly low down, for the steep Abor mountains are without pools of still water suitable for them. There are 3 parasites, 25 epiphytes, 48 climbers with short-lived herbaceous shoots, from

persistent underground parts, and 349 terrestrial herbs,—annual or perennial, ombrophilous or ombrophobous, from the denizen of the deep forest to the proletarian weed of the cleared cultivated patches, of which three hundred and forty-nine, 29 are just woody in a small degree.

TABLE 2.—*The Wild Flora by Zones.*

	Zone 1	Zone 2	Zone 3	Zone 4
HERBACEOUS SPECIES				
Aquatics	5	..	1	..
Parasites . . . . .	..	..	2	3
Epiphytes	7	3	13	10
Climbers	29	6	20	24
Terrestrial herbs	152	34	176	208
Total	193 or 50%	43 or 25%	212 or 36%	245 or 44%
WOODY SPECIES				
Parasites . . . . .	..	..	2	2
Epiphytes	2	..	9	9
Climbers and sprawlers	65	31	86	85
Shrubs	4	31	125	87
Trees	70	67	161	125
Total	191 or 50%	129 or 75%	383 or 64%	308 or 56%

Again among the woody plants there are 3 woody parasites, 11 woody epiphytes; 151 climbers or sprawlers,—some only just woody;—17 shrubs; and 248 trees, of which 69 may be classed as large trees.

Table 3 gives the elevation attained by the species of the Abor-land flora in the Eastern Himalaya, that is to say, not in Abor-land only, but in Sikkim whence all the higher observations have been derived. There are three parts of it, of which the first that should be considered is the middle part,—that is to say the figures relating to altitudes from the foot of the mountains to the highest that was attained by me in Abor-land. The figures of Table 3 have been cast into percentages in Table 4 with the slight alteration that herbaceous and woody parasites, herbaceous and woody epiphytes, herbaceous and woody climbers have been

taken together. The species known to occur in the Eastern Himalaya from the foot of the mountains to 1,000 feet, Table 3 shows, are 661 : and Table 4 shows that 34 per cent. are herbs : the same tables show that between 6,000 and 6,500 feet, out of 247 species, 40·9 per cent. are herbs. The intermediate columns indicate that the increase upwards in the percentage is not uniform, but accelerated after 4,000 feet has been attained. The same table shows that with the increased percentage of herbs there is a decreased percentage of trees, and of climbers and sprawlers, but not of shrubs. Aquatics, parasites and epiphytes change in percentage but little. It can be ascertained from Table 3 that of the climbers and sprawlers the woody ones are greatly reduced in proportion in ascending (from 16·2% to 5·3), but the herbaceous ones only slightly (from 5·4% to 4·4%); and the diagram on p. 73, wherein the whole of the herbaceous species are contrasted with the whole of the woody species, shows that from a considerable majority at 500 to 1,000 feet the woody plants gradually lose until at 6,000 to 6,500 feet the number of the two is approximately equal.

The third part of Tables 3 and 4 and the right hand end of the diagram just referred to, give the gradual disappearance of the species common to Sikkim and Abor-land, at the higher elevations recorded for the Sikkim Himalaya. The herbaceous plants, obviously and as expected, disappear less quickly than the woody species; and shrubs at 10,000 feet come to be better represented than trees, whereas the reverse was the case under 1,000 feet.

The first parts of Tables 3 and 4 (their first two columns of figures) and the left end of the diagram referred to, show that the species of Abor-land which are herbaceous, are successful in a greater measure in extending towards the centre of the Gangetic plains than the woody species, and that the trees in a very marked way lose their position. This last effect is mainly the work of man; and elsewhere in a short account of the vegetation of a part of Northern Bengal (*A note on the Terai Forests between the Gandak and the Teesta*, Journ. As. Soc., Bengal, XII, 1916, pp. 267-272) I have illustrated how it is brought about.

The proportionate decrease of woody plants upwards, however, is not due to man, but to the intrusion of cold periods, when water-absorption is hindered, and perhaps a little to the actual intrusion of rather dry periods. The flora of the driest parts of the Himalaya is, for instance, markedly herbaceous; and taking Duthie's list of the *Botany of the Chitral Relief Expedition* we find that woody plants make but 18 per cent. Again in my *Working list of the flora of Beluchistan* the woody plants existing wild make but 19 per cent.

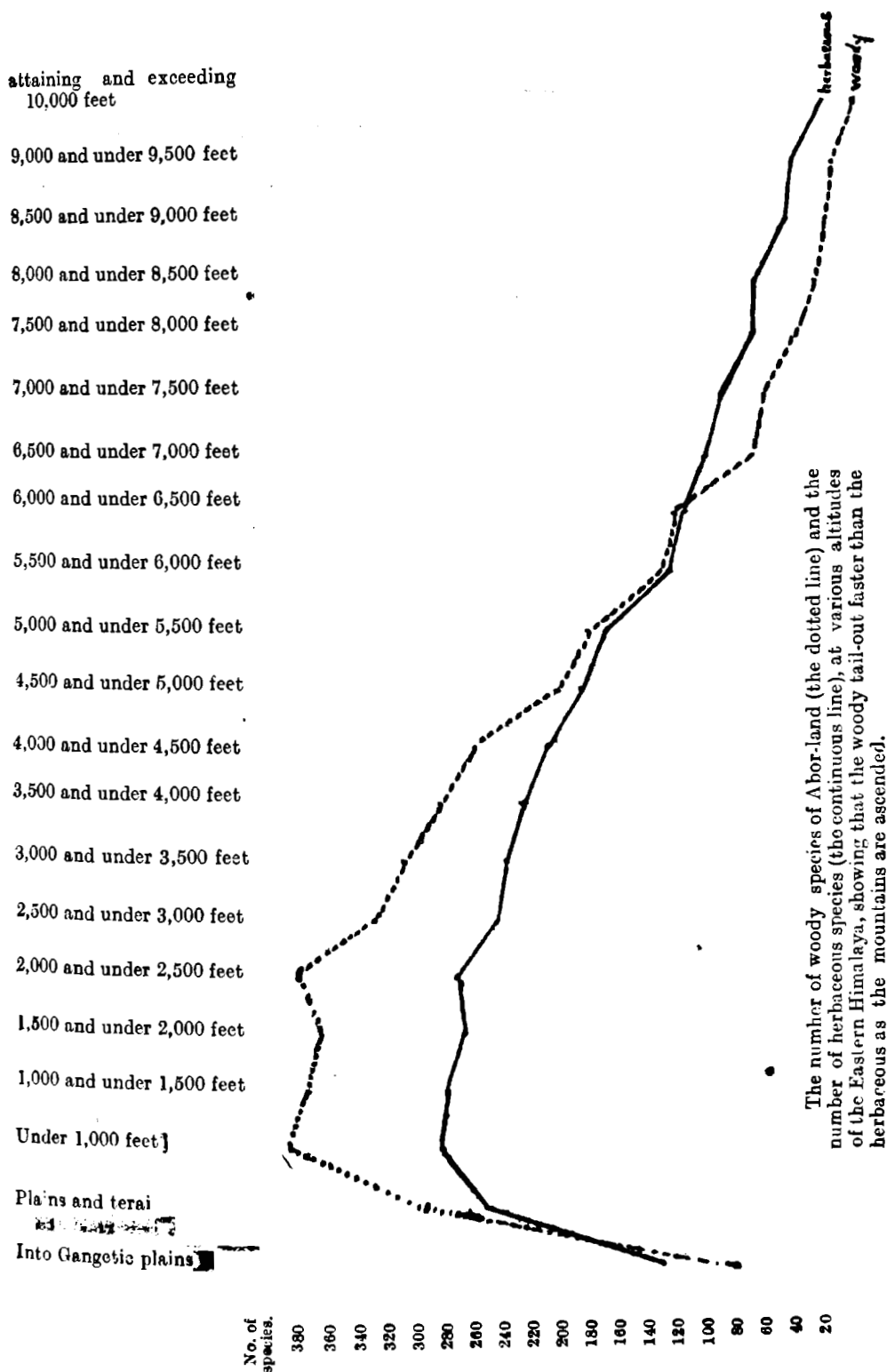
The outer Eastern Himalaya, and particularly the Abor Himalaya, has a climate which may be called tree-producing.

TABLE 3.—The wild flora by elevation in the Eastern Himalaya.

	Reaching centre of Gangetic plains	Assam plains and Bengal terai	Under 1,000 ft.	1,000 to 1,500 ft.	1,500 to 2,000 ft.	2,000 to 2,500 ft.	2,500 to 3,000 ft.	3,000 to 3,500 ft.	3,500 to 4,000 ft.	4,000 to 4,500 ft.	4,500 to 5,000 ft.	5,000 to 5,500 ft.	5,500 to 6,000 ft.	6,000 to 6,500 ft.	6,500 to 7,000 ft.	7,000 to 7,500 ft.	7,500 to 8,000 ft.	8,000 to 8,500 ft.	8,500 to 9,000 ft.	9,000 to 9,500 ft.	Over 9,500 ft.	
HERBACEOUS																						
Aquatics .	3	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Parasites .	..	..	1	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	1	1	..	..
Epiphytes .	1	8	16	13	11	11	9	11	13	14	11	10	6	6	2	2	..	..	..	..	..	..
Climbers .	15	34	37	39	38	39	34	30	27	27	24	20	11	11	6	6	2	2	2	1	1	1
Terrestrial herbs	114	206	225	224	222	220	196	195	180	169	148	139	109	101	86	72	70	70	50	47	32	32
WOODY																						
Parasites	..	1	1	1	1	2	1	1	2	1	1	1	1	1	..	..	..	..	..	..	..	..
Epiphytes	..	2	5	6	6	5	4	3	3	3	3	3	2	1	..	..	..	..	..	..	..	..
Climbers and sprawlers .	27	91	107	109	103	104	93	90	83	78	63	56	40	35	21	14	14	10	7	7	3	3
Shrubs .	24	79	105	94	95	102	86	78	73	58	68	55	47	45	20	14	13	10	8	8	5	5
Trees .	30	119	163	164	156	167	137	128	115	105	77	70	46	45	25	15	14	9	7	7	4	4
TOTAL	214	545	661	653	624	653	565	546	505	474	389	357	265	247	181	162	119	111	80	71	45	45

TABLE 4.—Percentages derived from Table 3.

	Reaching centre of Gangetic plains	Assam plains and Bengal terra	Under 1,000 ft.	1,000 to 1,500 ft.	1,500 to 2,000 ft.	2,000 to 2,500 ft.	2,500 to 3,000 ft.	3,000 to 3,500 ft.	3,500 to 4,000 ft.	4,000 to 4,500 ft.	4,500 to 5,000 ft.	5,000 to 5,500 ft.	5,500 to 6,000 ft.	6,000 to 6,500 ft.	6,500 to 7,000 ft.	7,000 to 7,500 ft.	7,500 to 8,000 ft.	8,000 to 8,500 ft.	8,500 to 9,000 ft.	9,000 to 9,500 ft.	Over 9,500 ft.
Aquatics	1.4	.9	.1	.1	.2	.2	.2	.2	.2	.2	.3	.3	.4	..	..	..	..	..	..	..	..
Parasites . . . . .	..	.2	.3	.5	.6	.5	.7	1.0	.8	1.0	1.0	.8	1.1	1.2	1.1	1.2	1.7	1.8	1.3	1.4	..
Terrestrial herbs	53.2	37.8	34.0	34.3	34.0	33.7	34.7	35.7	35.6	35.7	38.0	38.9	41.1	40.9	50.3	53.1	60.5	63.1	63.3	66.2	71.1
Epiphytes . . . . .	.5	1.8	3.2	2.9	2.6	2.6	2.3	2.6	3.2	3.6	3.6	3.6	3.0	2.8	1.1	1.2	..	..	..	..	..
Shrubs	11.2	14.5	15.9	14.4	15.2	15.6	15.8	15.4	15.4	15.4	14.9	15.4	17.7	18.2	18.2	12.3	11.8	11.7	12.7	11.3	11.1
Climbers and sprawlers	19.6	22.9	21.8	22.6	22.6	21.9	22.4	22.0	21.8	22.4	22.4	21.3	19.2	18.6	13.8	16.7	13.4	10.8	11.4	11.3,	8.9
Trees	14.1	21.8	24.7	25.1	25.0	25.5	24.2	23.3	23.8	22.2	19.8	19.6	17.3	18.2	15.4	15.4	12.6	12.6	11.4	9.9	8.9



PART

Table No. 5, giving the dispersal through the world

The left of each pair of pages gives the northern half of the distribution; rowest limits to those of widest distribution, the values calculated by the

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA, S(ikkim), B(hutan), A(ka Hills).	D(sapho Hills), A(oor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 0.</i>									
<i>(Endemic species.)</i>									
<i>Millusa dolichanthera</i>		A	..	..	..	..
<i>Xanthophyllum Burkillii</i>		A	..	..	..	..
<i>Vatica Shingkong</i>		A	..	..	..	..
<i>Rubus Burkillii</i>		A	..	..	..	..
<i>Eugenia aborensis</i>		D A	..	..	..	..
<i>Begonia Burkillii</i>		A	..	..	..	..
<i>Begonia irridescens</i>		A	..	..	..	..
<i>Begonia scintillans</i>		A	..	..	..	..
<i>Begonia aborensis</i>		A	..	..	..	..
<i>Brassaiopsis simplicifolia</i>		A M	..	..	..	..
<i>Brassaiopsis magnifica</i>		A	..	..	..	..
<i>Ophiorrhiza heterostyla</i>		A	..	..	..	..
<i>Adenosacme Listeri</i>		D A	..	..	..	..
<i>Psychotria aborensis</i>		A	..	..	..	..
<i>Lactuca brevisstris</i>		A	..	..	..	..
<i>Agapetes nutans</i>		A	..	..	..	..
<i>Agapetes marginata</i>		A	..	..	..	..
<i>Agapetes angulata</i>		A	..	..	..	..
<i>Sadleria Boweri</i>		A	..	..	..	..
<i>Bassia bntyraoides</i>		A M	..	..	..	..
<i>Buddleia candida</i>		A	..	..	..	..
<i>Aeschynanthus monetaria</i>		A	..	..	..	..
<i>Rhynchosyche calycinum</i>		A M	..	..	..	..
<i>Strobilanthes aborensis</i>		A	..	..	..	..
<i>Strobilanthes Burkillii</i>		A	..	..	..	..

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 92°.	Central Nepal.	E. HIMALAYA, S(Hikim), B(hutan), A(ka Hills).	D(ephis Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 0—contd.</i>									
<i>Strobilanthes secundus</i>		D A M	..	..	..	..
<i>Strobilanthes tenax</i>		A	..	..	..	..
<i>Phlogacanthus gracilis</i>		A M	..	..	..	..
<i>Rhinacanthus grandiflorus</i>		A	..	..	..	..
<i>Plectranthus Griffithii</i>		A M	..	..	..	..
<i>Stachys oblongifolia</i>		A	..	..	..	..
<i>Gomphostemma aborensis</i>		A	..	..	..	..
<i>Piper glaberrimum</i>		A	..	..	..	..
<i>Cryptocarya Andersonii</i>		A	..	..	..	..
<i>Andrachne emicans</i>		A	..	..	..	..
<i>Phyllanthus brevipes</i>		A M	..	..	..	..
<i>Glochidion mishmiense</i>		A M	..	..	..	..
<i>Elatostema Macintyreii</i>		A	..	..	..	..
<i>Elatostema arcuans</i>		A	..	..	..	..
<i>Elatostema imbricans</i>		A	..	..	..	..
<i>Smithiella myriantha</i>		A	..	..	..	..
<i>Musa aurantiaca</i>		A	..	..	..	..
<i>Musa velutina</i>		A	..	..	..	..
<i>Curculigo grandis</i>		D A	..	..	..	..
<i>Pleomele petiolata</i>		D A M	..	..	..	..
<i>Calamus floribundus</i>		D A M	..	..	..	..
<i>Arisaema Listeri</i>		D A	..	..	..	..
<i>Stuednera discolor</i>		A M	..	..	..	..
<i>Colocasia Mannii</i>		A	..	..	..	..
<i>Distribution value 131.</i>									
<i>Michelia Griffithii</i>		A	..	..	..	..
<i>Michelia punduana</i>		A	..	..	..	..
<i>Popowia Hookeri</i>		D A	..	..	..	..
<i>Stauntonia brunoniana</i>		A	..	..	..	..
<i>Eurya phyllanthoides</i>		A	..	..	..	..
<i>Pyrenaria barringtonifolia</i>		D A	..	..	..	..
<i>Impatiens laevigata</i>		A	..	..	..	..
<i>Miquella Kleinii</i>		A M	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. Tropical). M(ascaren).	PENINSULAR INDIA. Ceylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and (Chittagong).	BURMA. N(orth). L(ower). S(han hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. I(ava). B(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	<i>S. secundus.</i>
..	<i>S. tenax.</i>
..	<i>P. gracilis.</i>
..	<i>R. grandiflorus.</i>
..	<i>P. Griffithii.</i>
..	<i>S. oblongifolia.</i>
..	<i>G. aborensis.</i>
..	<i>P. glaberrimum.</i>
..	<i>C. Andersonii.</i>
..	<i>A. emicans.</i>
..	<i>P. brevipes.</i>
..	<i>G. mishmiense.</i>
..	<i>E. Macintyreii.</i>
..	<i>E. arcuans.</i>
..	<i>E. imbricans.</i>
..	<i>S. myriantha.</i>
..	<i>M. aurantiaca.</i>
..	<i>M. velutina.</i>
..	<i>C. grandis.</i>
..	<i>P. petiolata.</i>
..	<i>C. floribundus.</i>
..	<i>A. Listeri.</i>
..	<i>S. discolor.</i>
..	<i>C. Mannii.</i>
..	<i>M. Griffithii.</i>
..	<i>M. punduana.</i>
..	<i>P. Hookeri.</i>
..	<i>S. brunoniana.</i>
..	<i>E. phyllanthoides.</i>
..	<i>P. barringtoniaefolia.</i>
..	<i>I. laevigata.</i>
..	<i>M. Kleinii.</i>

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA, Sikkim, Butan, Aka Hills).	D(ephla Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution values 131—contd.</i>									
<i>Vitis obovata</i>		A	..	..	..	..
<i>Leea trifoliata</i>		A M	..	..	..	..
<i>Millettia piscidia</i>		A M	..	..	..	..
<i>Dalhouisia bracteata</i>		A	..	..	..	..
<i>Polyura geminata</i>		A M	..	..	..	..
<i>Ophiorrhiza calcarata</i>		A M	..	..	..	..
<i>Carlemannia tetragona</i>		A M	..	..	..	..
<i>Sylvianthus bracteatus</i>		D A	..	..	..	..
<i>Sylvianthus radicliflorus</i>		A	..	..	..	..
<i>Coffea khasiana</i>		A	..	..	..	..
<i>Amblyanthopsis membranacea</i>		D A	..	..	..	..
<i>Ardisia Thomsoni</i>		A	..	..	..	..
<i>Ardisia rhynchophylla</i>		A	..	..	..	..
<i>Tournefortia viridiflora</i>		A	..	..	..	..
<i>Tournefortia khasiana</i>		A	..	..	..	..
<i>Trichodesma khasianum</i>		A M	..	..	..	..
<i>Chkrita Hookeri</i>		A M	..	..	..	..
<i>Tetraphyllum bengalense</i>		A M	..	..	..	..
<i>Gomphostemma niveum</i>		A M	..	..	..	..
<i>Polygonum macranthum</i>		A	..	..	..	..
<i>Piper dekhoanum</i>		A	..	..	..	..
<i>Glauxylon khasianum</i>		A	..	..	..	..
<i>Elatostema decipiens</i>		A	..	..	..	..
<i>Quercus Listeri</i>		D A M	..	..	..	..
<i>Castanopsis castanicaarpa</i>		A	..	..	..	..
<i>Dendrobium acinaciforme</i>		A	..	..	..	..
<i>Hitchenia Careyana</i>		A	..	..	..	..
<i>Hedychium villosum</i>		A	..	..	..	..
<i>Smilax quadrata</i>		A	..	..	..	..
<i>Tupistra veratrifolia</i>		A	..	..	..	..
<i>Calamus gracilis</i>		A	..	..	..	..
<i>Panicum inleum</i>		A	..	..	..	..
<i>Arundoella intricata</i>		A	..	..	..	..
<i>Arundinaria Mannii</i>		A	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. F(ropical). M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(asterne).	S.-E. ASSAM HILL-TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). I(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(asterne Islands).	Australia.	Pacific.	Name.
..	K N	..	..	..	..	..	V. obovata.
..	G M	..	..	..	..	..	L. trifoliata.
..	K	..	..	..	..	..	M. piscidia.
..	C N M L	..	..	..	..	..	D. bracteata.
..	K N	..	..	..	..	..	P. geminata.
..	K N	..	..	..	..	..	O. calcarata
..	N	..	..	..	..	..	C. tetragona.
..	K C N M	..	..	..	..	..	S. bracteatus.
..	N M	..	..	..	..	..	S. radiceflorus.
..	K N M	..	..	..	..	..	C. khasiana.
..	K C N	..	..	..	..	..	A. membranacea.
..	K L	..	..	..	..	..	A. Thomsoni.
..	K	..	..	..	..	..	A. rhyncophylla.
..	K N L	..	..	..	..	..	T. viridiflora.
..	K	..	..	..	..	..	T. khasiana.
..	K N M	..	..	..	..	..	T. khasianum.
..	K	..	..	..	..	..	C. Hookeri.
..	C N M L	..	..	..	..	..	T. bengalense.
..	K	..	..	..	..	..	G. niveum.
..	K	..	..	..	..	..	P. macranthum.
..	N L	..	..	..	..	..	P. dekhoanum.
..	K C	..	..	..	..	..	C. khasianum.
..	K N	..	..	..	..	..	E. decipiens.
..	N	..	..	..	..	..	Q. Listeri.
..	M L	..	..	..	..	..	C. castanlecarpa.
..	K C N	..	..	..	..	..	D. acinaciforme.
..	K C N M	..	..	..	..	..	H. Careyana.
..	K N M L	..	..	..	..	..	H. villosum.
..	K	..	..	..	..	..	S. quadrata.
..	K	..	..	..	..	..	T. veratrifolia.
..	K C N L	..	..	..	..	..	C. gracilis.
..	N	..	..	..	..	..	P. lucidum.
..	K	..	..	..	..	..	A. intricata.
..	K	..	..	..	..	..	A. Manni.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim). Bhutan). A(ka Hills).	D(aphla Hills). A(ber Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 226, but in N. Burma only.</i>									
Camellia lutescens		D A M	N	..	..	..
Euonymus kachinensis		A	N	..	..	..
Pueraria bella		A	N	..	..	..
Mastersonia assamica		A M	N	..	..	..
Brassalopsis Griffithii		D A	N	..	..	..
Sadiria Griffithii		A	N	..	..	..
Parastyrax Laccii		A	N	..	..	..
Phlogacanthus parviflorus		A M	N	..	..	..
Smilax Griffithii		A	N	..	..	..
<i>Distribution value 226, e, but extending beyond Burma North.</i>									
Oxymitra fornicata		A	..	..	..	..
Tinospora Mastersii		A	..	..	..	..
Marcinia pedunculata		D A	N	..	..	..
Dipterocarpus pilosus		A	N	..	..	..
Heritiera macrophylla		A	N	..	..	..
Impatiens violaeifolia		A	..	..	..	..
Impatiens bracteolata		A	N	..	..	..
Chisocheton paniculatum		D A	..	..	..	..
Dalbergia Oliveri		A	N	..	..	..
Bauhinia rufa		A	..	..	..	..
Bauhinia divergens		A	N	..	..	..
Carallia lanceaeifolia		A	..	..	..	..
Combretum dasystachyum		D A	..	..	..	..
Illigera khasiana		A	N	..	..	..
Oxyspora cernua		D A M	N	..	..	..
Begonia Rox		A M	N	..	..	..
Spiradicella cylindrica		D A M	N	..	..	..
Spiradicella bifida		A	N	..	..	..
Brachytome Wallichii		A	N	..	..	..
Psychotria symplectifolia		A	..	..	..	..
Agapetes grandiflora		A M	N	..	..	..
Embelia parviflora		A	N	..	..	..
Symplocos Hookeri		A	..	..	..	..

SOUTHERN HALF.

Amorica.	AFRICA. T(roical), M(ascarcne).	PENINSULAR INDIA. C(cyoid), M(alabar), N(orthern), E(astern).	S.-E. ASSAM HILL TRACTS. G(aro Hills), K(hasia Hills), C(achar Hills), N(aga Hills), M(anipur Hills), L(ushai and Chittagong).	BURMA. N(orth), L(ower), S(han Hills), T(ensasserim).	MALAY PENINSULA. N(orth), E(ast), S(south).	MALAY ISLANDS. J(ava), R(orneo), E(astern Islands).	Australia.	Pacific.	Name.
..	N	..	..	..	..	C. lutescens.
..	N	..	..	..	..	B. kachinensis.
..	N	..	..	..	..	P. bella.
..	N	..	..	..	..	M. assamica.
..	N	..	..	..	..	B. Griffithii.
..	N	..	..	..	..	S. Griffithii.
..	N	..	..	..	..	P. Lacei.
..	N	..	..	..	..	P. parviflorus.
..	N	..	..	..	..	S. Griffithii.
..	L	T	..	..	..	O. fornicata.
..	L	..	..	..	..	T. Mastersii.
..	N	T	..	..	..	G. pedunculata.
..	N L	T	..	..	..	D. pilosus.
..	K C N	T	..	..	..	H. macrophylla.
..	T	..	..	..	I. violaeifolia.
..	K	T	..	..	..	I. bracteolata.
..	K C	L S T	..	..	..	C. pauciculatum.
..	N L	..	..	..	D. Oliveri.
..	K	L N S T	..	..	..	B. rufa.
..	K N	L	..	..	..	B. divergens.
..	T	..	..	..	C. lanceaeifolia.
..	G K C N	L L S	..	..	..	C. dasystachyum.
..	K N	N	..	..	..	I. khasiana.
..	K	L N	..	..	..	O. cernua.
..	K M	N S	..	..	..	B. Rex.
..	K N M	N	..	..	..	S. cylindrica.
..	K C M L	N	..	..	..	S. bifida.
..	K M	N	..	..	..	B. Wallichii.
..	K N	L S T	..	..	..	P. symplocifolia.
..	K N	N T	..	..	..	A. grandiflora.
..	K N	N	..	..	..	E. parviflora.
..	K L	T	..	..	..	S. Hookeri.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA, Sikkim, Tibetian, A (ka Hills).	D (apha Hills) A (bor Hills, etc.), V (ishmai Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 226, e, but extending beyond Burma North—contd.</i>									
<i>Jasminum coarctatum</i>		D A	..	..	..	..
<i>Linocera terniflora</i>		A	..	..	..	..
<i>Cynoglossum glochidiatum</i>		A	N	..	..	..
<i>Boea herbacea</i>		A	..	..	..	..
<i>Strobilanthes macrostegius</i>		A	..	..	..	..
<i>Acanthus leucostachyus</i>		D A	N	..	..	..
<i>Phlogacanthus Wallichii</i>		A	N	..	..	..
<i>Phlogacanthus asperulus</i>		A	..	..	..	..
<i>Sapria himalayana</i>		A M	N	..	..	..
<i>Loranthus Collettii</i>		A	N	..	..	..
<i>Baliospermum calycinum</i>		A M	N	..	..	..
<i>Quercus xylocarpa</i>		A	N	..	..	..
<i>Cephalotaxus Griffithii</i>		A M	N	..	..	..
<i>Eria clavicaulis</i>		A	N	..	..	..
<i>Globba multiflora</i>		A	N	..	..	..
<i>Hedyclium stenopetalum</i>		A	N	..	..	..
<i>Arisaema petiolulatum</i>		D A	N	..	..	..
<i>Aglanema hookerianum</i>	•	D A	N	..	..	..
<i>Carex composita</i>		A M	..	..	..	..
<i>Dinocloa MacClellandii</i>		A	..	..	..	..
<i>Distribution value 232, b.</i>									
<i>Garcinia stipulata</i>	S B	D A	..	..	..	..
<i>Ailanthus grandis</i>	S	A	..	..	..	..
<i>Lepisanthes Listeri</i>	S	D A	..	..	..	..
<i>Begonia inflata</i>	B	A	..	..	..	..
<i>Prenanthes scandens</i>	S	A M	..	..	..	..
<i>Machilus edulis</i>	S B	A	..	..	..	..
<i>Machilus gammieana</i>	S	A	..	..	..	..
<i>Elaeagnus pyriformis</i>	S	D A M	..	..	..	..
<i>Brielleia assamica</i>	S A	D A M	..	..	..	..
<i>Vanda bicolor</i>	B	A	..	..	..	..
<i>Goodyera grandis</i>	S	A	..	..	..	..
<i>Musa pruinosa</i>	S	A	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(essoid). M(alabar). N(orthern). E(estern).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(ouasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	K L	L T	..	..	..	..	J. coarctatum.
..	M L	L S	..	..	..	..	L. terniflora.
..	K	N	..	..	..	..	C. glochidiatum.
..	N	T	..	..	..	..	B. herbacea.
..	K L	L	..	..	..	..	S. macrostegius.
..	K C N	N	..	..	..	..	A. leucostachyus.
..	K	N S	..	..	..	..	P. Walllichii.
..	K L	S	..	..	..	..	P. asperulus.
..	N S	..	..	..	..	S. himalayana.
..	N S	..	..	..	..	L. Collettil.
..	K	N	..	..	..	..	B. calycinum.
..	N M	N	..	..	..	..	Q. xylocarpa.
..	C N M	N	..	..	..	..	C. Griffithii.
..	K	N	..	..	..	..	E. clavicaulis.
..	K C N M	N	..	..	..	..	G. multiflora.
..	K C N	N S	..	..	..	..	H. stenopetalum.
..	K M	N	..	..	..	..	A. petiolulatum.
..	K L	N L	..	..	..	..	A. hookerianum.
..	K N	T	..	..	..	..	C. composita.
..	L	L T	..	..	..	..	D. MacClellandii.
..	G. stipulata.
..	A. grandis.
..	L. Listeri.
..	B. inflata.
..	P. scandens.
..	M. edulis.
..	M. gammleana.
..	E. pyriformis.
..	B. assemica.
..	V. bicolor.
..	G. grandis.
..	M. pruinosa.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills).	D(ephla Hills). A(bor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S-W. China.	S.-E. China.	Japan.
<i>Distribution value 232, b—contd.</i>									
<i>Felcosanthes macrophylla</i>	S	D A M	..	..	..	..
<i>Polygonatum brevistylum</i>	S	A	..	..	..	..
<i>Tupistra Clarkel</i>	S	A	..	..	..	..
<i>Distribution value 363, b. a.</i>									
<i>Michella oblonga</i>		A D A	..	..	..	..
<i>Cyclea bicristata</i>	S B	A	..	..	..	..
<i>Hibiscus fragrans</i>	S	A	..	..	..	..
<i>Grewia serrulata</i>	S	A M	..	..	..	..
<i>Elaeocarpus sikkimensis</i>	S	A	..	..	..	..
<i>Dysoxylon pallens</i>	S	A M	..	..	..	..
<i>Aglala perviridis</i>	S	A	..	..	..	..
<i>Vitis planicaulis</i>	S	A M	..	..	..	..
<i>Aphania rubra</i>	S	A M	..	..	..	..
<i>Acer Thomsoni</i>	S B	A	..	..	..	..
<i>Sabia lanceolata</i>	S	D A	..	..	..	..
<i>Rhus Griffithii</i>	S	D A	..	..	..	..
<i>Begonia Griffithii</i>	S B	A	..	..	..	..
<i>Aralia foliolosa</i>	S B	A	..	..	..	..
<i>Macropanax undulatum</i>	S B	D A M	..	..	..	..
<i>Adenosacme stipulata</i>	S	A M	..	..	..	..
<i>Ixora acuminata</i>	S B	A	..	..	..	..
<i>Lasianthus Biermanni</i>	S	D A	..	..	..	..
<i>Rubia sikkimensis</i>	S B	A M	..	..	..	..
<i>Blumea macrostachya</i>	S	A	..	..	..	..
<i>Vaccinium venosum</i>	S B	D A M	..	..	..	..
<i>Rhododendron calophyllum</i>	B	A	..	..	..	..
<i>Lettsomia sikkimensis</i>	S	D A M	..	..	..	..
<i>Strobilanthes discolor</i>	B	A	..	..	..	..
<i>Piper Thomsoni</i>	S	A	..	..	..	..
<i>Piper curtistipes</i>	S	A	..	..	..	..
<i>Litea laeta</i>	S B	A	..	..	..	..
<i>Phyllanthus Clarkel</i>	S	A	..	..	..	..
<i>Ficus Hookeri</i>	S	A	..	..	..	..
<i>Ficus sikkimensis</i>	S	A	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. Tropical). M(ascarene).	PENINSULAR INDIA. Ceylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chitta- gong).	BERMA. N(orth). L(ower). S(han hills). T(everescim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	<i>P. macrophylla.</i>
..	<i>P. brevistylum.</i>
..	<i>T. Clarkel.</i>
..	K	..	..	..	..	..	<i>M. oblonga.</i>
..	M	..	..	..	..	..	<i>C. bicristata.</i>
..	C N	..	..	..	..	..	<i>H. fragrans.</i>
..	G K	..	..	..	..	..	<i>G. serrulata. |</i>
..	G	..	..	..	..	..	<i>E. sikkimensis.</i>
..	K	..	..	..	..	..	<i>D. pallens.</i>
..	K C	..	..	..	..	..	<i>A. perviridis.</i>
..	K C	..	..	..	..	..	<i>V. planicaulis.</i>
..	G N M L	..	..	..	..	..	<i>A. rubra.</i>
..	N M L	..	..	..	..	..	<i>A. Thomsoni.</i>
..	G K M	..	..	..	..	..	<i>S. lanceolata.</i>
..	K	..	..	..	..	..	<i>R. Griffithi.</i>
..	N	..	..	..	..	..	<i>B. Griffithi.</i>
..	K	..	..	..	..	..	<i>A. foliolosa.</i>
..	G K C M	..	..	..	..	..	<i>M. undulatum.</i>
..	M	..	..	..	..	..	<i>A. stipulata.</i>
..	K C	..	..	..	..	..	<i>I. acuminata.</i>
..	K N M	..	..	..	..	..	<i>L. Biermanni.</i>
..	N M	..	..	..	..	..	<i>R. sikkimensis.</i>
..	K	..	..	..	..	..	<i>B. macrostachya.</i>
..	K	..	..	..	..	..	<i>V. venosum.</i>
..	K N	..	..	..	..	..	<i>R. calophyllum.</i>
..	K C N	..	..	..	..	..	<i>L. sikkimensis.</i>
..	K	..	..	..	..	..	<i>S. discolor.</i>
..	N	..	..	..	..	..	<i>P. Thomsoni.</i>
..	K	..	..	..	..	..	<i>P. curtistipes.</i>
..	K M	..	..	..	..	..	<i>L. laeta.</i>
..	K	..	..	..	..	..	<i>P. Clarkel.</i>
..	K M	..	..	..	..	..	<i>F. Hookeri.</i>
..	K	..	..	..	..	..	<i>F. sikkimensis.</i>

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(SIKKIM). R(Rutan) A(ka Hills).	D(ephia Hills). A(oor Hills etc.). M(ishmi Hills).	Burma N(orth).	S. W. (China).	S.-E. China.	Japan.
<i>Distribution value 353, b. a.—contd.</i>									
<i>Ficus prostrata</i>	S	A	..	..	..	..
<i>Calanthe angusta</i>	S	A	..	..	..	..
<i>Phalaenopsis Mannii</i>	S	A	..	..	..	..
<i>Goodyera hispida</i>	S	A	..	..	..	..
<i>Dioscorea Wattii</i>	S	A	..	..	..	..
<i>Polygonatum Cathcartii</i>	S	A	..	..	..	..
<i>Forrestia Hookeri</i>	S B	A	..	..	..	..
<i>Livistona jenkinsiana</i>	S	D A	..	..	..	..
<i>Distribution value 458, b-c.</i>									
<i>Clematis sikkimensis</i>	S B	A M	N	..	..	..
<i>Xadsura Roxburghiana</i>	S	A	N	..	..	..
<i>Melodorum bicolor</i>	S	A	N	..	..	..
<i>Melodorum polyanthum</i>		A D A	..	..	..	..
<i>Paricampylus aduncus</i>	S	A	..	..	..	..
<i>Capparis multiflora</i>	S B	A	N	..	..	..
<i>Boydia suaveolens</i>	S B	A	N	..	..	..
<i>V.ola glaucens</i>	S	A	N	..	..	..
<i>Rennettia longipes</i>	S	D A	N	..	..	..
<i>Gynocardia odorata</i>	S	A	N	..	..	..
<i>Calophyllum polyanthum</i>	S	A	..	..	..	..
<i>Saurauja Roxburghii</i>	S B A D A	A	N	..	..	..
<i>Echinocarpus sterculiaceus</i>	S B A D A M	A	N	..	..	..
<i>Impatiens tripetala</i>	S B	A	N	..	..	..
<i>Zanthoxylon hamiltonianum</i>	S	A	N	..	..	..
<i>Aglaia Chittagonga</i>	B A D A	A	N	..	..	..
<i>Brucea mollis</i>	S	A	N	..	..	..
<i>Vitis bracteolata</i>	S	A	N	..	..	..
<i>Aesculus punduana</i>	S	A	N	..	..	..
<i>Drimycarpus racemosus</i>	S B	A	N	..	..	..
<i>Terminalia myriocarpa</i>	S B D A	A	N	..	..	..
<i>Oxyspora vagans</i>	B	A M	..	..	..	..
<i>Memecylon coelestrinum</i>	S	D A	..	..	..	..
<i>Casarea Vareca</i>	S	D A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. Tropical. Mascarene).	PENINSULAR INDIA. Ceylon. Malabar. Northern. Eastern).	S.-E. ASSAM HILL TRACTS. Garo Hills). Khasia Hills). Cachar Hills). Naga Hills). Mnipur Hills). Lushai and Chittagong).	BURMA. North). Lower). Shan Hills). Tenasserim).	MALAY PENINSULA. North). East). South).	MALAY ISLANDS. Java). Borneo). Eastern Islands).	Australia.	Pacific.	Name.
..	K C N	..	..	..	..	..	F. prostrata.
..	K M	..	..	..	..	..	C. angusta.
..	K	..	..	..	..	..	P. Mannii.
..	K	..	..	..	..	..	G. hispida.
..	K N	..	..	..	..	..	D. Wattii.
..	N	..	..	..	..	..	P. Cathcartii.
..	K N L	..	..	..	..	..	F. Hookeri.
..	N	..	..	..	..	..	L. jenkinsiana.
..	N	N L	..	..	..	..	C. silkkimensis.
..	K C	N	..	..	..	..	K. Roxburghiana.
..	N M	N L	..	..	..	..	M. bicolor.
..	K L		T	..	..	..	M. polyanthum.
..	K	L		..	..	..	P. aduncus.
..	K C N M	N		..	..	..	C. multiflora.
..	K C L	N		..	..	..	R. suaveolens.
..	N		..	..	..	V. glaucescens.
..	K L	N		..	..	..	B. longipes.
..	K L	N		..	..	..	G. odorata.
..	K L	L S T		..	..	..	C. polyanthum.
..	K C N M L	N L S T		..	..	..	S. Roxburghii.
..	C L	N T		..	..	..	E. sterculaceus.
..	C	N		..	..	..	I. tripetala.
..	K N	N S		..	..	..	Z. hamiltonianum.
..	K C L	N L T		..	..	..	A. Chittagonga.
..	K N M	N L S T		..	..	..	B. mollis.
..	K C N L	N L T		..	..	..	V. bracteolata.
..	G K	N S T		..	..	..	A. punduana.
..	K C L	N L		..	..	..	D. racemosus.
..	K C N M	N		..	..	..	T. myriocarpa.
..	G K N M L	S		..	..	..	O. vagans.
..	L	L T		..	..	..	M. coelestrinum.
..	K C N L	N		..	..	..	C. Vareca.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim). Bhutan). A(ka Hills).	D(aphla Hills). A(oor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 458, b-c.—contd.</i>									
<i>Begonia barbata</i>	S B	A M	N	..	..	..
<i>Viburnum colebrookianum</i>	S B	D A	N	..	..	..
<i>Ophiorrhiza ochroleuca</i>	S B	D A	N	..	..	..
<i>Carlemania Griffithii</i>	S B	A	N	..	..	..
<i>Myrloneuron nutans</i>	B	U A	N	..	..	..
<i>Vernonia talaumaefolia</i>	S	D A	N	..	..	..
<i>Vernonia volkameriaefolia</i>	S B	D A	N	..	..	..
<i>Vernonia scandens</i>	S	A	N	..	..	..
<i>Campanumoea parviflora</i>	S	A	N	..	..	..
<i>Jasminum anastomosans</i>	S B	A	N	..	..	..
<i>Linoceira macrophylla</i>	B	D A	N	..	..	..
<i>Wrightia coccinea</i>	S	A	N	..	..	..
<i>Tournefortia Candollei</i>	B	A	..	..	..	..
<i>Lettsomia strigosa</i>	S	A	N	..	..	..
<i>Argyrea argentea</i>	S	A	N	..	..	..
<i>Solanum spirale</i>	S	A	N	..	..	..
<i>Solanum subtruncatum</i>	S	A	..	..	..	..
<i>Aeschynanthus gracilis</i>	S B	A	N	..	..	..
<i>Aeschynanthus micrantha</i>	S	A	N	..	..	..
<i>Lysionotus Griffithii</i>	S B	D A M	N	..	..	..
<i>Boeica filiformis</i>	B	A	N	..	..	..
<i>Boeica fulva</i>	B	D A M	..	..	..	..
<i>Rhynchotechum ellipticum</i>	S B	A	N	..	..	..
<i>Rhynchotechum vestitum</i>	S B	A	N	..	..	..
<i>Strobilanthes coloratus</i>	S B	D A	N	..	..	..
<i>Phlogacanthus curviflorus</i>		A D A	N	..	..	..
<i>Phlogacanthus guttatus</i>	B	A	N	..	..	..
<i>Peristrophe fers</i>	B	A	..	..	..	..
<i>Clerodendron colebrookianum</i>	S	A	N	..	..	..
<i>Piper diffusum</i>	S	A	N	..	..	..
<i>Knema longifolia</i>	S	D A	N	..	..	..
<i>Litsea khasiana</i>	S	A M	N	..	..	..
<i>Daphne involucrata</i>	S B	D A	..	..	..	..
<i>Elatostema hookerianum</i>	S	A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. Tropical M(ascarene).	PENINSULAR INDIA. C(eylon) M(alabar), N(orthern), E(aster).n).	S.-E. ASSAM HILL TRACTS. G(aro Hills), K(hasia Hills), C(achar Hills), N(aga Hills), M(oinpur Hills), L(ushai and Chittagong).	BURMA. N(orth), L(ower), S(han Hills), I(enasserim).	MALAY PENINSULA. N(orth), E(ast), S(south).	MALAY ISLANDS. J(ava), H(orneo), E(aster. n Islands).	Australia.	Pacific.	Name.
..	M L	N S	..	..	..	..	B. barbata.
..	K M	N	..	..	..	..	V. colebrooklanum.
..	K C N	N	..	..	..	..	O. ochroleuca.
..	K	N	..	..	..	..	C. Griffithii.
..	K C N M L	N	..	..	..	..	M. nutans.
..	N	N	..	..	..	..	V. talaumaefolia.
..	K N M	N L S T	..	..	..	..	V. volkameriaefolia.
..	G K M L	N L	..	..	..	..	V. scandens.
..	K C N M	N S	..	..	..	..	C. parviflora.
..	K C N M L	N L S T	..	..	..	..	J. anastomosans.
..	K	N L S T	..	..	..	..	L. macrophylla.
..	K C L	N S	..	..	..	..	W. coccinea.
..	K M L	T	..	..	..	..	T. Candollei.
..	N M L	N L S	..	..	..	..	L. strigosa.
..	K N L	N	..	..	..	..	A. argentea.
..	K C N M	N S	..	..	..	..	S. spirale.
..	K C N	L	..	..	..	..	S. subtruncatum.
..	K C M	N T	..	..	..	..	A. gracilis.
..	K C	N	..	..	..	..	A. micrantha.
..	K M	N	..	..	..	..	L. Griffithii.
..	K C N	N	..	..	..	..	B. filiformis.
..	K	S	..	..	..	..	D. fulva.
..	K C N L	N T	..	..	..	..	R. ellipticum.
..	K M	N	..	..	..	..	R. vestitum.
..	G K N	N	..	..	..	..	S. coloratus.
..	K C N M L	N L S T	..	..	..	..	P. curviflorus.
..	K N L	N	..	..	..	..	P. guttatus.
..	K N L	T	..	..	..	..	P. fern.
..	K C N L	N S T	..	..	..	..	C. colebrooklanum.
..	K N	N	..	..	..	..	P. diffusum.
..	G K N M L	N L T	..	..	..	..	K. longifolia.
..	K	N	..	..	..	..	L. khasiana.
..	K N	T	..	..	..	..	D. involucrata.
..	K N	N	..	..	..	..	E. hookerianum.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim) Bhutan) A(ka Hills).	D'aphia Hills) A(ber Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 453, b-c.—</i> concl.									
Elatostema dissectum	S	A M	N	:	:	:
Quercus pachyphylla	S	A	N	:	:	:
Quercus lanceaefolia	S B A	D A	N	:	:	:
Phalaenopsis Parishii	S B	A	..	:	:	:
Vanda teres	S	A	N	:	:	:
Zenixine goodyeroides	S	A M	..	:	:	:
Hetaeria rubens	S	A	N	:	:	:
Polygonosanthus Bakeri	S	A M	N	:	:	:
Dioscorea lepcharum	S	\	N	:	:	:
Pinanga gracilis	S B	D A	N	:	:	:
Calamus flagellum	S	A	N	:	:	:
Calamus leptospadix	S B	D A	N	:	:	:
Calamus acanthospathus	S B	A	N	:	:	:
Alocasia foliata	S	A	N	:	:	:
Pothos vrieianus	S B	D A	N	:	:	:
Arundinaria griffithiana	S B	A	N	:	:	:
Bambusa pallida	S B	D A	N	:	:	:
Dendrocalamus Hookeri	S	D A	N	:	:	:
Cephalostachyum fuchsianum	S B	D A	N	:	:	:
<i>Distribution value, 466, d.</i>									
Grewia nana	N		A	..	..	..	..
Hoya arnottiana	N	S	A	..	..	..	..
<i>Distribution value 541, l.</i>									
Triumfetta cana		A	..	..	..	..
Pithecolobium montanum		A M	N	..	..	..
Rubus lucens		D A M	N	..	..	..
Elatostema papillosum		A	N	..	..	..
Quercus semiserrata		D A	N	..	..	..
Sarcanthus subulatus		D A	..	..	..	..
<i>Distribution value 555, f.</i>									
Arthrocnemum rudis		A	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(cylon). M(alabar). N(orthen). E(astern).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(hachar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chitta- gong).	BURMA. N(orth). I(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). P(astern Islands).	Australia.	Pacific.	Name.
..	K N	N	..	..	..	..	E. dissectum.
..	N M	N	..	..	..	..	Q. pachyphylla.
..	G K C M L	N L S	..	..	..	..	Q. lanceaeifolia.
..	C	S T	..	..	..	..	P. Parishii.
..	K L	N	..	..	..	..	V. teres.
..	L	..	..	..	..	Z. goodyeroides.
..	K L	N	..	..	..	..	H. rubens.
..	G K	N	..	..	..	..	P. Bakeri.
..	N	..	..	..	..	D. lepcharum.
..	K C M L	N L T	..	..	..	..	P. gracilis.
..	K C M	N	..	..	..	..	C. flagellum.
..	K N M	N	..	..	..	..	C. leptospadix.
..	G K	N	..	..	..	..	C. acanthospathus.
..	K L	N	..	..	..	..	A. fallax.
..	G K N	N	..	..	..	..	P. vriesianus.
..	K	N	..	..	..	..	A. griffithiana.
..	K C N	N L	..	..	..	..	B. pallida.
..	K	N	..	..	..	..	D. Hookeri.
..	N	..	..	..	..	C. fuchsianum.
..	G. nana.
..	ll. arnottiana.
..	K N M L	..	..	J	..	..	T. cana.
..	K N	..	..	J B	..	..	P. montanum.
..	K N M	N S T	..	E	..	..	R. lucens.
..	K L	N L S T	..	J	..	..	E. papillosum.
..	G K C N M	N L S T	..	J	..	..	Q. semiserata.
..	K C L	..	N S	J B E	..	..	S. subulatus.
..	..	C	....	..	..	..	..	..	A. rudis.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA, S(Ikkim), B(hutan), A(ka Hills).	D(aphia Hills), A(bor Hills, etc.), M(ishmai Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 579, g.</i>									
Meliosma dilleniifolia	S	..	S	A	..	..	..	..
Mazus surculosus	N S	N	S	A	..	..	..	..
Macaranga pustulata	S	..	S	A	..	..	..	..
Populus ciliata	N S	..	S B	A	..	..	..	..
Luisia inconspicua	S	..	S	A	..	..	..	..
Rhaphidophora grandis	S	N	S	A	..	..	..	..
<i>Distribution value 586, h.</i>									
Gymnocladus chinensis	A	..	..	..	..
Gleditschia Delavayi	A	..	..	..	..
Pilea insolens	A M	..	..	..	..
<i>Distribution value 597, d-a.</i>									
Erythralum vagum	N	S	D A M	..	..	..	..
Rubus Hamiltonii	N	S B	A	..	..	..	..
Piper peepuloides	N	S B	A	..	..	..	..
Hedychium gardnerianum	N	S	A	..	..	..	..
Toxaria fusca	N	S	A	..	..	..	..
Carex insignis	N	S B	A	..	..	..	..
<i>Distribution value 641, y.</i>									
Dasymaschalon longiflorum	A	N	..	..	..
Tinomisium petiolare	A	..	..	..	..
Webera odorata	A	..	..	..	..
Psychotria fulva	A	..	..	..	..
Stauroanthera umbrosa	A M	N	..	..	..
Quercus lappacea	D A	..	..	..	..
Smilax megacarpa	A	..	..	..	..
<i>Distribution value 686, f.</i>									
Görophandra axillaris	A	..	..	..	..
Jasminum flexile	A	..	..	..	..
Piper hymenophyllum	A	..	..	..	..
<i>Distribution value 692, d-a.</i>									
Talauma Hodgsoni	N	S	D A	N	..	..	..
Evodia fraxinifolia	N	S	A	N	..	..	..

SOUTHERN HALF.

America.		AFRICA. T(rropical). M(mascarene).		PENINSULAR INDIA. C(cylon). M(alabar). N(orthern). E(eastern).		S.-E. ASSAM HILL TRAC G(aoro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).		BURMA. N(orth). L(ower). S(han Hills). T(enasserim).		MALAY PENINSULA. N(orth). E(ast). S(outh).		MALAY ISLANDS. J(ava). R(orneo). E(astero Islands).		Australia.	Pacific.	Name.
..	M. dillenaeifolia.	
..	M. surculosus.	
..	M. pustulata.	
..	P. cillata.	
..	L. inconspicua.	
..	R. grandis.	
..	G. chinensis.	
..	G. Delavayi.	
..	P. insolens.	
..	E. vagum.	
..	R. Hamiltonii.	
..	P. peepuloides.	
..	H. gardnerianum.	
..	T. fusca.	
..	C. insignis.	
..	D. longiflorum.	
..	T. petiolare.	
..	W. odorata.	
..	P. fulva.	
..	S. umbrosa.	
..	Q. lappacea.	
..	S. megacarpa.	
..	G. axillaris.	
..	J. flexile.	
..	P. hymenophyllum.	
..	T. Hodgsoni.	
..	E. fraxintifolia.	

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim, Bhutan, Aka Hills).	D(aphia Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 692, d-a— contd.</i>									
Mangifera sylvatica	N	S	A	..	..	..	..
Tapiria hirsuta	N	S B	D A	N	..	..	..
Spondias axillaris	N	S	D A	N	..	..	..
Prunus acuminata	N	S B	D A M	N	..	..	..
Osbeckia nepalensis	N	S	A	N	..	..	..
Osbeckia nutans	N	S	A	N	..	..	..
Thladiantha calcarata	N	S	A	N	..	..	..
Uncaria sessilifructus	N	S B	A	N	..	..	..
Hedyotis scandens	N	S	A D A	N	..	..	..
Mussaenda Roxburghii	N	S	A	..	..	..	..
Psychotria denticulata	N	S B	A	..	..	..	..
Agapetes setigera	N		A	N	..	..	..
Beaumontia grandiflora	N	S	A	N	..	..	..
Hoya fusca	N	S	A	..	..	..	..
Exacum teres	N	S B	D A	N	..	..	..
Thunbergia coccinea	N	S	A	N	..	..	..
Pogostemon glaber	N	S B	A	N	..	..	..
Cryptocarya amygdalina	N	S	A	N	..	..	..
Litsea salicifolia	N	S	A	N	..	..	..
Balanophora dioica	N	S	A	N	..	..	..
Artocarpus Chaplasha	N	S	A	N	..	..	..
Castanopsis indica	N	S B	D A	N	..	..	..
Bulbophyllum reptans	N	S B	A	N	..	..	..
Eria stricta	N	S	A	N	..	..	..
Otochilus alba	N	S	A	N	..	..	..
Otochilus fusca	N	S	A	N	..	..	..
Dioscorea Prazeri	N	S B	A	N	..	..	..
Polygonatum oppositifolium	N	S B	D A	N	..	..	..
Calamus erectus	N	S B	A	N	..	..	..
Rhaphidophora glauca	N	S B	D A	N	..	..	..
<i>Distribution value 710, g-a.</i>									
Stephania elegans	N S	N	S	A	..	..	..	..
Dicentra scandens	S	N	S B	A M	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. Tropical M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittakong).	BURMA. N(orth). J(lower). S(han Hills). T(ennessee).	MALAY PENINSULA. N(orth). E(ast). S(south).	MALAY ISLANDS. J(ava). B(ornco). E(astern Islands).	Australia.	Pacific.	Name.
..	K L	L	..	..	..	..	M. sylvatica.
..	K N L	N S	..	..	..	..	T. hirsuta.
..	N	..	..	..	..	S. axillaris.
..	G K M	N S	..	..	..	..	P. acuminata.
..	G C N	N S	..	..	..	..	O. nepalensis.
..	K N M	N	..	..	..	..	O. nutans.
..	K C N M L	N L	..	..	..	..	T. calcarata.
..	K C N L	N L T	..	..	..	..	U. sessilifructus.
..	K N M L	N L S T	..	..	..	..	H. scandens.
..	K C M L		T	..	..	..	M. Roxburghil.
..	K N M		T	..	..	..	P. denticulata.
..	K C	N L S T	..	..	..	..	A. setigera.
..	C L	N	..	..	..	..	B. grandiflora.
..	K M L	L	..	..	..	..	H. fusca.
..	K N M	N	..	..	..	..	E. teres.
..	K N	N S T	..	..	..	..	T. coccinea.
..	G K L	N S	..	..	..	..	P. glaber.
..	K	N	..	..	..	..	C. amygdalina.
..	G K C N L	N L S	..	..	..	..	L. salicifolia.
..	K N	N L T	..	..	..	..	B. dioica.
..	K C N L	N L T	..	..	..	..	A. Chaplasha.
..	K C L	N S	..	..	..	..	C. indica.
..	K N	N	..	..	..	..	B. reptans.
..	G K C N	N	..	..	..	..	E. stricta.
..	K N M	N	..	..	..	..	O. alba.
..	K C N M	N S	..	..	..	..	O. fusca.
..	N	N S T	..	..	..	..	D. Prazerl.
..	K N M L	N	..	..	..	..	P. oppositifolium.
..	K M L	N L	..	..	..	..	C. erectus.
..	K N M L	N	..	..	..	..	R. glauca.
..	K N L	..	..	..	..	..	S. elegans.
..	K	..	..	..	..	..	D. scandens.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim, Bhutan, Aka Hills).	Daphla Hills), Abor Hills, etc.), Mishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 710, g-a— contd.</i>									
<i>Impatiens racemosa</i>	..	N S	N	S	A	..	..	..	..
<i>Euonymus frigidus</i>	..	S	..	S B A	A	..	..	..	..
<i>Vitis rumicarpa</i>	..	S	N	S	A	..	..	..	..
<i>Pimpinella tenera</i>	..	S	..	S	A	..	..	..	..
<i>Wendlandia Wallichii</i>	..	S	N	S	A	..	..	..	..
<i>Aristolochia saccata</i>	..	S	N	S	A	..	..	..	..
<i>Piper nepalensis</i>	..	S	N	S B	A M	..	..	..	..
<i>Coelogyne ovalls</i>	..	S	N	S B	A	..	..	..	..
<i>Calantne alismaefolia</i>	..	S	..	S	A	..	..	..	..
<i>Smilax parvifolia</i>	..	N S	N	S	A	..	..	..	..
<i>Wallichia densiflora</i>	..	S	..	S B	A	..	..	..	..
<i>Distribution value 773, b-1.</i>									
<i>Sterculia coccinea</i>	S B	A	N	..	..	..
<i>Rhopalocnemis phalloides</i>	S	A	..	..	..	..
<i>Ostodes paniculata</i>	S B	A	N	..	..	..
<i>Conocephalus suaveolens</i>	S B	A	N	..	..	..
<i>Pilea smilacifolia</i>	S	A M	N	..	..	..
<i>Tacca laevis</i>	B	D A	N	..	..	..
<i>Forrestia glabrata</i>	S	A	..	..	..	..
<i>Pollia subumbellata</i>	S B A	A M	..	..	..	..
<i>Distribution value 781, e-f.</i>									
<i>Clansena heptaphylla</i>	A	..	..	..	..
<i>Distribution value 787, b-f.</i>									
<i>Curcuma Amada</i>	S	A	..	..	..	..
<i>Distribution value 805, g-e.</i>									
<i>Hypericum nepalense</i>	..	N S	N	S	A	N	..	..	..
<i>Eurya symlocina</i>	..	S	N	S	A M	..	..	..	..
<i>Saurauja nepalensis</i>	..	S	N	S	A M	N	..	..	..
<i>Elaeocarpus Braccanus</i>	..	S	..	..	A M	N	..	..	..
<i>Trichosanthes cordata</i>	..	S	..	S	A	..	..	..	..
<i>Brassalopsis aculeata</i>	..	S	N	S	A	N	..	..	..
<i>Uncaria pilosa</i>	..	S	N	S B	A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. I(tropical). M(ascarenc).	PENINSULAR INDIA. C(Ceylon). M(Mabar). N(northern). E(asterne).	S.-E. ASSAM HILL- TRACTS G(Garo Hills). K(Khasia Hills). C(Cachar Hills). N(Naga Hills). M(Manipur Hills). L(Lushai and Chitta- gong).	BURMA. N(north). L(lower). S(south Hills). T(Tenasserim).	MALAY PENINSULA. N(north). E(asterne). S(south).	MALAY ISLANDS. J(Java). B(Borneo). E(asterne Islands).	Australia.	Pacific.	Name.
..	K	..	..	..	..	..	I. racemosa.
..	K	..	..	..	..	..	E. frigidus.
..	K M	..	..	..	..	..	V. rumicisperm
..	N	..	..	..	..	..	P. tenera.
..	K N M	..	..	..	..	..	W. Walllichii.
..	K C N L	..	..	..	..	..	A. saccata.
..	K	..	..	..	..	..	P. nepalensis.
..	K M L	..	..	..	..	..	C. ovalis.
..	K	..	..	..	..	..	C. alismaefolia.
..	K	..	..	..	..	..	S. parvifolia.
..	K N L	..	..	..	..	..	W. densiflora.
..	K C M L	N L T	..	J	..	..	S. coccinea.
..	K	..	..	J	..	..	R. phalloides.
..	K N M	N L S	..	J	..	..	O. paniculata.
..	K N L	N L S T	..	J B E	..	..	C. suaveolens.
..	K N L	N L S T	..	J E	..	..	P. smilacifolia.
..	G K C N L	N L T	..	J B	..	..	T. laevis.
..	K N M	L T	..	J	..	..	F. glabrata.
..	G K C N M	..	..	B	..	..	P. subumbellata.
..	..	M E	K C L	..	..	..	..	..	C. heptaphylla.
..	..	E	....	..	..	..	..	..	C. Amada.
..	K N M	N	..	..	..	..	H. nepaulense.
..	N	S	..	..	..	..	E. symplocina.
..	K N M	N S	..	..	..	..	S. nepalensis.
..	N M	N	..	..	..	..	E. Braccanva.
..	K C	J	..	..	..	..	T. cordata.
..	K	N	..	..	..	..	B. aculeata.
..	K N L	N L S T	..	..	..	..	U. pilosa.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim. Bhutan. Aka Hills.	Daphla Hills). Aoor Hills, etc.). Mishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 805, g-e.— contd.</i>									
<i>Blumea procera</i>	..	S	N	S	A	N	..	..	..
<i>Trachelospermum fragrans</i>	..	N S	..	S B	A	N	..	..	..
<i>Lysionotus serrata</i>	..	S	N	S	A	N	..	..	..
<i>Phlogacanthus thyrsoiflorus</i>	..	N S	..	S B	A	N	..	..	..
<i>Strobilanthes glomeratus</i>	..	S	..	..	..	..	..	..	..
<i>Cinnamomum glanduliferum.</i>	..	S	N	S	A	N	..	..	..
<i>Machilus Gamblei</i>	..	S	..	S B	D A	N	..	..	..
<i>Lindera pulcherrima</i>	..	S	N	S	D A	..	..	..	..
<i>Morus laevigata</i>	..	N S	..	S	D A	N	..	..	..
<i>Ficus nemoralis</i>	..	N S	N	S B	D A	N	..	..	..
<i>Sarcochlamys pulcherrima</i>	..	S	N	S B	A	N	..	..	..
<i>Arisaema concinnum</i>	..	S	N	S B	A	N	..	..	..
<i>Dendrocalamus Hamiltonii</i>	..	S	..	S	A	N	..	..	..
<i>Distribution value 812, h-e.</i>									
<i>Capparis tenella</i>	A	N	Y	..	..
<i>Ixora subsessilis</i>	D A	N	Y	..	..
<i>Maesa permolis</i>	A	N	Y	..	..
<i>Ligustrum robustum</i>	A	N	Y	..	..
<i>Clerodendron griffithianum</i>	A	N	Y	..	..
<i>Gomphostemma lucidum</i>	D A	N	Y	..	..
<i>Ficus sylhetensis</i>	A	N	Y	..	..
<i>Quercus Rex</i>	D A	N	Y	..	..
<i>Stuednera capitellata</i>	A	N	Y	..	..
<i>Distribution value 848, l-e.</i>									
<i>Millettia pulchra</i>	A	N	Y	H	..
<i>Codonacanthus pauciflorus</i>	A M	N	..	H	..
<i>Distribution value 854, bl.</i>									
<i>Jasminum undulatum</i>	S B	D A	..	..	H	..
<i>Distribution value 873, b-y</i>									
<i>Milusa Roxburghiana</i>	S	D A	N	..	..	..
<i>Celreia febrifuga</i>	S B	A M	N	..	..	..
<i>Leplonurus sylvestris</i>	S	A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. J(tropical). M(mascarene).	PENINSULAR INDIA. C(eylon). M(mabar). N(orthern). E(asterne).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(amrup Hills). L(ushai and Chittagong).	BURMA. N(orth). I(lower). S(nan Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(south).	MALAY ISLANDS. J(ava). R(orneo). E(asterne Islands).	Australia.	Pacific.	Name.
..	K N M L	N L	..	..	..	..	B. procera.
..	K L	N S	..	..	..	..	T. fragrans.
..	K N	N S	..	..	..	..	I. serrata.
..	N	N L T	..	..	..	..	P. thyrsoiflorus.
..	G K	T	..	..	..	..	S. glomeratus.
..	K	N	..	..	..	..	C. glanduliferum.
..	N	..	..	..	..	M. Gamblei.
..	K N M	S T	..	..	..	..	I. pulcherrima.
..	K C N	N L S T	..	..	..	..	M. laevigata.
..	F M	N	..	..	..	..	F. nemoralis.
..	K C L	N L S T	..	..	..	..	S. pulcherrima.
..	N	N	..	..	..	..	A. conclinum.
..	G K N	N L	..	..	..	..	D. Hamiltonii.
..	L	N L T	..	..	..	..	C. tenella.
..	K C N M L	N S T	..	..	..	..	I. subsessilis.
..	N L S T	..	..	..	..	M. permollis.
..	N M L	N L S	..	..	..	..	L. robustum.
..	N	..	..	..	..	C. griffithianum.
..	K	N S T	..	..	..	..	G. lucidum.
..	N M	N	..	..	..	..	F. sylhetensis.
..	N M	N	..	..	..	..	Q. Rex.
..	N	..	..	..	..	S. capitellata.
..	K N M	N S T	..	..	..	..	M. pulchra.
..	K N L	N	..	..	..	..	C. pauciflorus.
..	K N	..	..	..	..	..	J. undulatum.
..	K N L	N L S T	N	..	..	..	M. Roxburghiana.
..	N	N S	J E	..	..	C. febrifuga.
..	K N L	N T	N E S	..	..	..	L. sylvestris.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. S (ikkim). B (buçan). A (ka Hillis).	D (aphle Hillis). A (oor Hillis, etc.). M (ishmi Hillis).	Burma N (orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 873, b-y— cont. l.</i>									
<i>Cardiopteryx moluccana</i>	S	A	N	..	..	..
<i>Medinilla rubicunda</i>	S	A	..	..	..	..
<i>Hodgsonia heteroclita</i>	S	A	N	..	..	..
<i>Mussaenda glabra</i>	S	D A	..	..	..	..
<i>Plectronia glabra</i>	S	A	..	..	..	..
<i>Jacziela vasculosa</i>	S B	D A M	N	..	..	..
<i>Piper pedicellosum</i>	S	A	..	..	..	..
<i>Baccaurea sapida</i>	S	A	N	..	..	..
<i>Macaranga denticulata</i>	S	A	N	..	..	..
<i>Ceratostylis teres</i>	S	A	N	..	..	..
<i>Acanthephippium sylhetense</i>	S	A	..	..	..	..
<i>Pellosanthes violacea</i>	B	D A	N	..	..	..
<i>Smilax odoratissima</i>	S B	A	N	..	..	..
<i>Heterosmilax indica</i>	S	☉	N	..	..	..
<i>Distribution value 918, b-af.</i>									
<i>Allophylus zeylanicus</i>	S	A	..	..	..	..
<i>Distribution value 941, ra.</i>									
<i>Actinostemma tenerum</i>		A	..	..	H	J
<i>Acanthopanax aculeata</i>		A M	..	Y	H	J
<i>Distribution value 949, bha.</i>									
<i>Medinilla himalayana</i>	S	A	..	Y	..	..
<i>Symplocos glomerata</i>	S B	A	..	Y	..	..
<i>Pogostemon elscholzooides</i>	B A	D A	..	Y	..	..
<i>Distribution value 985, bla.</i>									
<i>Oenanthe benghalensis</i>	B A		..	..	H	..
<i>Distribution value 1007, d-l.</i>									
<i>Brassalopsis speciosa</i>	N	S	A	..	..	..	..
<i>Pratia montana</i>	N	S B	A M	N	..	..	..
<i>Solanum crassipetalum</i>	N	S B	A M	N	..	..	..
<i>Ficus elastica</i>	N	S B	D A	N	..	..	..
<i>Pollia Aclista</i>	N	S B	A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(evlon). M(alabar). N(orthern). E(aster).n).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). G(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(aster).n Islands).	Australia.	Pacific.	Name.
..	C N	N L S T	N E S	J E	..	..	C. moluccana.
..	K L	..	N	..	..	..	M. rubicunda.
..	K C M L	N L	N E	J B	..	..	H. heteroclita.
..	K C M L	L	N E S	J B	..	..	M. glabra.
..	K L	L T	N S	J B	..	..	P. glabra.
..	G K N	N S T	N E S	..	..	..	J. vasculosa.
..	N	..	N S	..	..	..	P. pedicellosum;
..	K C L	N S T	N S	..	..	..	B. sapida.
..	N L	N L T	N E	J	..	..	M. denticulata.
..	K	..	N S	J	..	..	C. teres.
..	K	..	N	..	..	..	A. sylhetense.
..	G K C L	N L J	N E S	..	..	..	P. violacea.
..	K M L	N S T	N	J	..	..	S. odoratissima.
..	K L	N S	S	B	..	..	H. Indica.
..	..	C	C N	..	..	..	..	..	A. zeylanicus.
..	K	..	..	..	..	..	A. tenrum.
..	K N M	S	..	..	..	..	A. aculeata.
..	K	..	..	..	..	..	M. himalayana.
..	K N M	..	..	..	..	..	S. glomerata.
..	K	..	..	..	..	..	P. elscholzoides.
..	C N L	..	..	..	..	..	O. benghalensis.
..	K N M L	S	..	J	..	..	B. speciosa.
..	N M	N	..	J	..	..	P. montana.
..	K	N	..	E	..	..	S. crassipetalum.
..	K M L	N L	..	J	..	..	P. elastica.
..	K	N	..	J	..	..	P. Acclisia.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim), R(hutan), A(ka Hills).	D(aphle Hills), A(oor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1013, b-ef.</i>									
Aspidopteris Roxburghiana	S B	A M	N	..	..	..
Meliosma pinnata	S	D A	N	..	..	..
Erythrina stricta	S	A	N	..	..	..
Eugenia Walllichii	S B	A	..	..	..	..
Olea dioica	S	A	N	..	..	..
Myxopyrum smilacifolium	S	D A	..	..	..	..
Stereospermum chelonoides	S B	A	N	..	..	..
Pogostemon intermedius	S	D A M	..	..	..	..
Ficus mysorensis	S	A	N	..	..	..
Liparis viridiflora	S B	A	N	..	..	..
Amomum dealbatum	S	D A	N	..	..	..
Alpinia Allughas	S B	A	N	..	..	..
Caryota urens	S	A	..	..	..	..
<i>Distribution value 1044, bhc.</i>									
Aspidocarya uvifera	S	A	N	Y	..	..
Saurauja punduana	S B	A M	N	Y	..	..
Impatiens arguta	S	A	N	Y	..	..
Eugenia tetragona	S B	A	N	Y	..	..
Eugenia balsamea	S	D A	N	Y	..	..
Sarcosperma arborum	S B	A	N	Y	..	..
Ipomoea Kingii	S B	A	..	Y	..	..
Clerodendron nutans	S B	D A	N	Y	..	..
Quercus dealbata	B	A	N	Y	..	..
Castanopsis Hystrix	S B	A	N	Y	..	..
Calanthe biloba	S	A	..	Y	..	..
Rhaphidophora Hookeri	S	D A	N	Y	..	..
Pseudostachyum polymorphum	S B	A	N	Y	..	..
<i>Distribution value 1080, ble.</i>									
Osebeckia crinita	S	A	..	Y	H	..
Aeschynanthus acuminata	S B	D A	N	..	H	..
Thunbergia grandiflora	S B	A	N	..	H	..
Kranthium palatiferum	S B	A	N	..	H	..
Smilax lanceaeifolia	S	A	N	..	H	..

SOUTHERN HALF.

America.	AFRICA. T(tropical) M(ascarene).	PENINSULAR INDIA. C(eylon) M(alabar) N(orthern) E(asterne).	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(ensserim).	MALAY PENINSULA. N(orth). E(ast). S(south).	MALAY ISLANDS. J(ava). B(orneo). E(asterne Islands).	Australia.	Pacific.	Name.
..	..	M E	K N M	N L T	..	..	..	..	A. Roxburghiana.
..	..	E	K M L	N	..	..	..	..	M. pinnata.
..	..	M E	M L	N L	..	..	..	..	E. stricta.
..	..	E	K L	T	..	..	..	..	E. Wallichii.
..	..	M	K C N L	N	..	..	..	..	O. dtoica.
..	..	M	K C N M L	L T	..	..	..	..	M. smilacifolium.
..	..	C M E	K C M L	N L S	..	..	..	..	S. chelonoides.
..	..	M	G K N	L	..	..	..	..	P. intermedius.
..	..	C M	K N L	N L T	..	..	..	..	F. mysorensis.
..	..	C M	K N	N	..	..	..	..	L. viridiflora.
..	..	E	K N L	N L S	..	..	..	..	A. dealbatum.
..	..	C M	K N	N L T	..	..	..	..	A. Allughas.
..	..	C M	K N M L	L	..	..	..	..	C. urens.
..	N	N S	..	..	..	..	A. uvifera.
..	K C N M L	N L	..	..	..	..	S. punduana.
..	K N	N S	..	..	..	..	I. arguta.
..	K C	N	..	..	..	..	E. tetragona.
..	K C N L	N L S T	..	..	..	..	E. balsamea.
..	G K M	N L S	..	..	..	..	S. arboreum.
..	K N	S	..	..	..	..	I. Kingii.
..	K C M L	N	..	..	..	..	C. nutans.
..	K N M	N	..	..	..	..	Q. dealbata.
..	K C	N	..	..	..	..	C. Hystrix.
..	C N	T	..	..	..	..	C. biloba.
..	G K C N M L	N	..	..	..	..	R. Hockeri.
..	G N M	N	..	..	..	..	P. polymorphum.
..	K N	S	..	..	..	..	O. crinita.
..	K C N	N	..	..	..	..	A. acuminata.
..	K C N M L	N	..	..	..	..	T. grandiflora.
..	G K C N M L	N T	..	..	..	..	E. palatiferum.
..	K C N M L	N S	..	..	..	..	S. lancaefolia.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills). D(aphla Hills). A(bor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1996, ff.</i>								
Garcelia Morcella D A	..	..	..	..
Acer niveum A M	..	..	..	..
<i>Distribution value 1107, d-y.</i>								
Psychotria calocarpa	N	S .. S	N	..	..	..
Cunanga Falcatae	N	S .. A M	..	..	..	..
<i>Distribution value 1130, g-i</i>								
Blumea aromatica	S	..	S .. D A	N	..	..	..
Ficus plaberrima	S	..	S B .. D A	N	..	..	..
<i>Distribution value 1127, hl.</i>								
Ardisia virens A M	N	Y	..	..
<i>Distribution value 1141, h-f.</i>								
Zingiber roseum A	..	Y	..	..
<i>Distribution value 1163, h.</i>								
Gynura sarmentosa A	..	..	H	..
Ficus fistulosa A	N	..	H	..
Ficus pyriformis A	N	Y	H	..
Aranga pinnata A	N	..	H	..
<i>Distribution value 1193, tha.</i>								
Enonyma thanaefolia	N	S B .. A	..	Y	..	..
<i>Distribution value 1196, yf.</i>								
Galysopertia floribunda A	N	..	..	..
Ophiorhiza Mungos A	..	..	..	..
Piper nigrum D A	N	..	..	..
Actephila meliophorensis A M	N	..	..	..
Typhonium trilobatum A	..	..	..	..
<i>Distribution value 1220, g-y.</i>								
Elaeocarpus Varuna	S	..	S .. D A	..	..	..	..
Microtropis thicolor	S	..	S .. A	N	..	..	..
Tylophora exilis	S	N	S B .. D A	..	..	..	..
Engelhardtia splenata	S	N	S B .. D A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. Tropical. M(ascarene).	PENINSULAR INDIA C(cyclo). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL TRACTS. G(ao Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittazong).	BURMA. N(orth). L(ower). S(han Hills). T(enassetim).	MALAY PENINSULA N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). R(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	..	C M.	G K C	..	..	J	E	..	G. Morella.
..	..	E	....	S T	..	J B	E	..	A. niveum.
..	K C L	N L T	N E S	..	..	..	P. calocarpa.
..	C L	T	N E	J B E	..	..	C. Fel-terrae.
..	K N	N L T	..	J	..	..	P. aromatica.
..	K N L	N T	..	J	..	..	F. glaberrima.
..	L T	N	B	..	..	A. virens.
..	..	N E	..	..	..	..	..	..	Z. roseum.
..	S	N E S	J B E	..	..	G. sarmentosa.
..	K N L	N L T	N E S	J B E	..	..	F. fistulosa.
..	K N L	N L S T	N	..	..	..	F. pyriformis.
..	K	N L S T	N E S	J B E	..	..	A. pinnata.
..	K M	..	..	..	..	..	E. theaeifolius.
..	..	E	L	N L S T	N S	..	..	..	C. floribunda.
..	..	C M	K N	L	N	J	..	..	O. Mungos.
..	..	M	K N L	N S	N	E	..	..	P. nigrum.
..	..	C M	K L	N S	N	..	..	..	A. neilgherensis.
..	..	C M	....	L	E S	..	..	..	T. trilobatum.
..	K N L	T	N	..	..	..	E. Varunna.
..	K N M L	N L S T	N	..	..	..	M. discolor.
..	K C L	T	N	..	..	..	T. exilis.
..	K N M L	N L S T	N	J B E	..	..	E. spicata.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills).	D(apha Hills). A(bor Hills, etc.). M(shmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1247, d-cf.</i>									
Natsiatum herpeticum	N	S	D A	..	..	..	..
Leea crispa	N	S	A	N	..	..	..
Eria muscicola	N	S	A	N	..	..	..
<i>Distribution value 1265, g-af.</i>									
Citrus Aurantium	S	..	S	A	..	..	..	..
Liparis bituberculata	S	N	S	D A	..	..	..	..
<i>Distribution value 1268, br.</i>									
Melia Toosendan	B	A	N	Y	..	J
<i>Distribution value 1276, dr.</i>									
Mimulus nepalensis	N	S B	A	..	Y	..	..
<i>Distribution value 1277, d-u.</i>									
Melastoma normale	N	S B	A	N	..	..	..
<i>Distribution value 1278, dhe</i>									
Senecio trilingulatus	N	S B	A M	N	Y	..	..
Lactuca gracilis	N	S	A	N	Y	..	..
Caryopteris paniculata	N	S B	A M	N	Y	..	..
<i>Distribution value 1296, gha</i>									
Chrysosplenium nepalense	S	N	S B	D A	..	Y	..	..
Gallum triflorum	N S	..	S B	A	..	Y	..	..
Pilea asymmeria	S	..	S	A	..	Y	..	..
<i>Distribution value 1314, dl.</i>									
Camellia drupifera	N	S	A	N	..	H	..
Vernonia saligna	N	S B A	D A	N	..	H	..
Torenia vagans	N	S	D A M	N	Y	H	..
Cinnamomum obtusifolium	N	S	D A	N	..	H	..
Pilea bracteosa	N	S B	A M	N	..	H	..
Dendrobium nobile	N	S B	A	N	Y	H	..
<i>Distribution value 1328, b-if.</i>									
Dysoxylon procerum	S B	A	N	..	..	..
Dysoxylon binectariferum	S	A	..	..	..	..

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(ceylon). M(alabar). N(orthen). E(aster). C	S.-E. ASSAM HILL TRACTS. G(aro Hills). K(hasia Hills). C(acher Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. I(ava). E(orneo). E(estern Islands).	Australia.	Pacific.	Name.
..	..	E	L	L	T	..	..	..	N. herpeticum.
..	..	M E	K	L	N L T	..	..	..	L. crispa.
..	..	C	K		N	T	..	..	E muscicola
..	..	K E	E	M	..	..	..	..	C. Aurantium.
..	..	F	K		..	..	..	..	L. bituberculata.
..	K		N		..	..	M. Toosendan.
..	M. nepalense.
..	K	L	N L S	L	J B F	F	M. normale.
..		N M	N	..	..	..	S. trilingulata.
..	K C	N M	N S	..	..	..	L. gracilis.
..		M L	N S	..	..	..	C. paniculata.
..		N M	..	..	..	..	C. nepalense.
..		M	..	..	..	..	G. triflorum.
..	K		..	..	..	..	P. gymneria.
..	K	N M	N S T	..	..	..	C. drupifera.
..	K	M L	N S	..	..	..	V. saligna.
..	K C	N L	N	..	..	..	T. vagans.
..	G K	N L	N L T	..	..	..	C. obtusifolium.
..	K	N M	N	..	..	..	P. bracteocea.
..	k		N	..	..	..	D. nobile.
..	..	E	K	N M L	N L T	..	J B	..	D. procerum.
..	..	C M	K	L	..	..	J	..	D. binectariferum.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim), B(hutan), A(ka Hills).	D(aphia Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1328, b-if-- contd.</i>									
Gardenia campanulata	S	A	..	..	..	..
Vangueria spinosa	S	A	N	..	..	..
Senecio Walkeri	S B	A M	N	..	..	..
Mallotus albus	S	D A	N	..	..	..
Boehmeria malabarica	S	A M	N	..	..	..
<i>Distribution value 1332, gl.</i>									
Hovenia dulcis	N S	..	S B	A	..	Y	H	..
<i>Distribution value 1341, ol.</i>									
Salacia prinoides		A	..	..	..	..
Celtis trinervia		A	..	..	..	..
<i>Distribution value 1351, rl.</i>									
Damnacanthus indicus		A M	..	Y	H	J
Calamintha gracilis		A M	..	Y	H	J
<i>Distribution value 1359, bhl.</i>									
Rubus lineatus	S B	A M	N	Y	..	..
Altingia excelsa		B A D A	N	Y	..	..
Randia acuminata	S B	A	N	Y	..	..
<i>Distribution value 1360, g-el.</i>									
Tinospora cordifolia	S	..		A	N	..	..	..
Stephania glabra	S	N	S	A	..	..	..	..
Kydia calycina	S	N	S	A	N	..	..	..
Sterculia urens	S	..		A	..	..	..	..
Sterculia villosa	S	..		A	N	..	..	..
Pteropermum acerifolium	S	N	S	A	N	..	..	..
Citrus medica	S	..	S	A	N	..	..	..
Zizyphus rugosa	S	N	S	A	N	..	..	..
Leea aspera	N S	N	S	A	..	..	..	..
Terminalia Chebula	N S	N	S	A	N	..	..	..
Vernonia Roxburghii	S	..		A	N	..	..	..
Anaphalis araneosa	N S	N	S	A	N	..	..	..
Porana paniculata	S	N	S	A	N	..	..	..

SOUTHERN HALF.

America.	AFRICA. T(rropical). M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(asterm).	S.-E. ASSAM HILL TRACTS. G(garo Hills). K(khasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). F(ast). S(outh).	MALAY ISLANDS. J(ava). E(orneo). E(asterm Islands).	Australia.	Pacific.	Name.
..	..	E	C N L	L T	..	J B	..	..	G. campanulata.
..	..	M E	K C L	N L S T	..	J	..	..	V. spinosa.
..	..	C M	K N M	N	..	J	..	..	S. Walkeri.
..	..	C M	K C L	N	..	B	..	..	M. albus.
..	..	C M	K C N I	N L S T	..	J E	..	..	B. malabarica.
..	K N	..	..	..	..	..	H. dulcis.
..	..	U A E	K	L S T	N F S	J V E A	..	..	S. prinoidea.
..	..	C M E	....	T	N F S	J B E A	..	..	C. trinervia.
..	E	..	..	D. indicus.
..	J E	..	..	G. gracilis.
..	N	N*	..	J L	..	..	R. lineatus.
..	K N	N L T	..	J	..	..	A. excelsa.
..	K L	N L T	..	J E	..	..	R. acuminata.
..	..	C M N E	L	N L T	..	..	..	..	T. cordifolia.
..	..	M	K	S T	..	..	..	..	S. glabra.
..	..	M N E	C M	N L S	..	..	..	..	K. calycina.
..	..	C M N E	..	L T	..	..	..	..	S. urens.
..	..	M N E	C	N L T	..	..	..	..	S. villosa.
..	..	E	K C M L	N L S T	..	..	..	..	P. acerifolium.
..	..	M N E	G K C L	N	..	..	..	..	C. medica.
..	..	C M N E	K L	N L S T	..	..	..	..	Z. rugosa.
..	..	M N E	K C	L	..	..	..	..	L. aspera.
..	..	C M N E	L	N S T	..	..	..	..	T. Chebula.
..	..	E	K N M	N S T	..	..	..	..	V. Roxburghii.
..	..	M	K N M	N S	..	..	..	..	A. arancosa.
..	..	N E	N	N	..	..	..	..	P. paniculata.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA Sikkim. Bhutan. Aka Hills).	Dapha Hills). Akor Hills, etc.). Mishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1360, q-ef— contd.</i>									
<i>Rungia repens</i>	N S	..	S	A	..	..	..	..
<i>Holmskioldia sanguinea</i>	N S	N	S B	D A	N	..	..	..
<i>Plectranthus coetza</i>	N S	..	S	D A M	N	..	..	..
<i>Loranthus pulverulentus</i>	N S	N	S B	A	N	..	..	..
<i>Villebrunia integrifolia</i>	N S	N	S	A	N	..	..	..
<i>Ficus scandens</i>	S	..	S B	A	..	..	..	..
<i>Oberenia Falconeri</i>	S	..		A	..	..	..	..
<i>Dendrobium moechatum</i>	S	N	S B	A	N	..	..	..
<i>Arisaema tortuosum</i>	S	N	S	A	N	..	..	..
<i>Arundinella Wallichii</i>	N S	N	S	A	..	..	..	..
<i>Distribution value 1366, uf.</i>									
<i>Allophylus Cobbe</i>		A	N	..	..	..
<i>Distribution value 1380, bhy.</i>									
<i>Blumea densiflora</i>	S	D A	N	Y	..	..
<i>Maesa ramentacea</i>	S B	A	N	Y	..	..
<i>Chloranthus officinalis</i>	S B	A	..	Y	..	..
<i>Ficus obtusifolia</i>	S	A	N	Y	..	..
<i>Distribution value 1388, g-ef.</i>									
<i>Ficus Cuzla</i>	N S	N	S B	A	N	..	..	..
<i>Distribution value 1391, ghe.</i>									
<i>Brachystemma calycinum</i>	S	N	S	A	N	..	..	..
<i>Zanthoxylon acanthopodium</i>	S	N	S B	A	N	Y	..	..
<i>Corlaria nepalensis</i>	N S	..	S B	A M	N	Y	..	..
<i>Lactuca polycephala</i>	N S	..	S	A	N	Y	..	..
<i>Campanula cana</i>	S	..		A M	..	Y	..	..
<i>Ulmus lanceifolia</i>	S	..	S B	A	..	Y	..	..
<i>Pilea scripta</i>	N S	N	S B	A M	N	Y	..	..
<i>Betula alnoides</i>	S	N	S B	A M	N	Y	..	..
<i>Pothos Cathcartii</i>	S	..	S	A	N	Y	..	..
<i>Carex Thomsonii</i>	S	..	S B	A	N	Y	..	..

SOUTHERN HALF.

Name.	Pacific.	Australia.	MALAY ISLANDS. J(ava). B(orneo). I(astern Islands).	MALAY PENINSULA. N(orth). E(ast). S(outh).	BURMA. N(orth). I(ower). S(han Hills). T(enasserim).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chitta- gong).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(astern).	AFRICA. T(ropical). M(ascarene).	America.
<i>R. repens.</i>	S T	....	C M N E	..	..
<i>H. sanguinea.</i>	N L S T	G K N	E	..	..
<i>P. Coetza.</i>	S	G K N M	C M	..	..
<i>I. pulverulentus.</i>	N L S	N M	N	..	..
<i>V. integrifolia.</i>	N L S T	K C M L	C	..	..
<i>F. scandens.</i>	L	K	N E	..	..
<i>O. Falconeri.</i>	S	....	M E	..	..
<i>D. moschatum.</i>	T	L	E	..	..
<i>A. tortuosum.</i>	N L	K K	E	..	..
<i>A. Wallichii.</i>	S	K C	N E	..	..
<i>A. Colbae.</i>	..	A P	E	N E S	T	L	E	..	..
<i>B. densiflora.</i>	J	N	S	K K N L	..	..	..
M. ramentacea.	J B	N E S	S T	K K N M L	..	..	..
<i>G. officinalis.</i>	J B E	N E S	T	K C N	..	..	..
<i>F. obtusifolia.</i>	N	S T	G K M L	..	..	..
<i>F. Curia.</i>	T	K K N L	..	..	..
<i>D. calycinum.</i>	S	N M	N E	..	..
<i>Z. acanthopodium.</i>	S	N M	..	..	..
<i>G. nepalensis.</i>	S	M	..	..	..
<i>L. lakcephylla.</i>	S	M	..	..	..
<i>G. emu.</i>	S	....	..	..	..
<i>U. lanceolata.</i>	T	K N L	..	..	..
<i>P. scripta.</i>	T	M	..	..	..
<i>B. alnicoides.</i>	T	K K	..	..	..
<i>F. Cernicarum.</i>	S	K K	..	..	..
<i>G. Thomsenii.</i>	N	K K	..	..	..

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills).	D(apha Hills). A(bor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1395, bli.</i>									
<i>Sarcopyramis nepalensis</i>	S	A	N	Y	H	..
<i>Helicia erratica</i>	S	D A	N	..	H	..
<i>Ficus obscura</i>	S	A	N	..	H	..
<i>Distribution value 1399, gle.</i>									
<i>Acer oblongum</i>	..	N S	N	S	A M	..	Y	H	..
<i>Osbeckia stellata</i>	..	N S	N	S	[D A	N	..	H	..
<i>Mosla dianthera</i>	..	N S	N	S B	A	..	Y	H	..
<i>Fagopyrum cymosum</i>	..	N S	N	S	A	N	Y	H	..
<i>Elatostema platyphyllum</i>	..	S	..	S	D A	N	..	H	..
<i>Castanopsis tribuloides</i>	..	S	N	S	A	N	..	H	..
<i>Paris polyphylla</i>	..	N S	N	S B	[D A	N	Y	H	..
<i>Streptolirion volubile</i>	..	S	..	S B	A	N	Y	H	..
<i>Distribution value 1408, lo.</i>									
<i>Plectrocolea angustifolia</i>	A	N	Y	H	..
<i>Distribution value 1428, b-yl.</i>									
<i>Mesua ferrea</i>	B	A	N	..	..	..
<i>Chikrasia tabularis</i>	S	A	N	..	..	..
<i>Leca robusta</i>	S	A	..	..	..	..
<i>Chavalia lurida</i>	S	A	N	..	..	..
<i>Fagraea obovata</i>	B	A	N	..	..	..
<i>Merremia vitifolia</i>	S	A	N	..	..	..
<i>Piper attenuatum</i>	S B	A	..	..	..	..
<i>Croton caudatum</i>	S B	A	..	..	..	..
<i>Cleistanthus javanicum</i>	S	D A	N	..	..	..
<i>Elatostemma acuminatum</i>	S	A	N	..	..	..
<i>Alpinia malaccensis</i>	S	A	N	..	..	..
<i>Lasia spinosa</i>	S	D A	N	..	..	..
<i>Distribution value 1496, bly.</i>									
<i>Pericampylus glaucus</i>	S	A	N	Y	H	..
<i>Celastrus Champloni</i>	S	D A	N	..	H	..
<i>Alsomitra clavifera</i>	S	D A	..	..	H	..
<i>Blumea myriocephala</i>	A A	N	..	H	..

SOUTHERN HALF.

America.	AFRICA. T(ropic). M(ascarcie).	PENINSULAR INDIA. C(cylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(hachar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(south).	MALAY ISLANDS. I(ava). I(ornoo). E(astern Islands).	Australia.	Pacific.	Name.
..	K C N M	N L S	..	J	..	..	S. nepalensis.
..	K	N S T	..	B	..	..	H. erratica.
..	K	N	..	B	..	..	F. obscura.
..	K N M	S	..	..	..	..	A. oblongum.
..	M L	N	..	..	..	..	O. stellata.
..	K N L	L S	..	..	..	..	M. dianthera.
..	K N M	N S	..	..	..	..	F. cymosum.
..	K N L	N	..	..	..	..	E. platyphyllum.
..	K C N M L	N L S	..	..	..	..	C. tribuloides.
..	K N M	N S	..	..	..	..	P. polyphylla.
..	K N M	N	..	..	..	..	S. volubile.
..	K N M L	N T	N	..	..	..	P. angustifolia.
..	..	C M	K M L	N T	N	..	..	..	M. ferrea.
..	..	C M	C L	N L S T	N	B	..	..	C. tabularis.
..	..	M N E	K L	L T	N S	..	..	..	L. robusta.
..	..	C M	K C N	N L T	N E S	J B E	..	..	C. lurida.
..	..	C M	K C M L	N L S	N E S	J E	..	..	F. obovata.
..	..	C M N E	L	N L S T	N E S	J B E	..	..	M. vitifolia.
..	..	M	K	L	N	J	..	..	P. attenuatum.
..	..	C E	K C N L	L	N E S	J B E	..	..	C. caudatum.
..	..	C M	K N M L	N L S T	N	J E	..	..	C. javanicum.
..	..	C M	K N	N	N E S	J	..	..	E. acuminatum.
..	..	M	K N L	N L S	N	J E	..	..	A. malaccensis.
..	..	C E	G K L	N L S	N E S	J B E	..	..	I. spinosa.
..	K N L	N L S T	N E S	J B E	..	..	P. glaucus.
..	K N M L	N S T	N E	..	..	..	C. Championii.
..	K N	T	N	..	..	..	A. clavigera.
..	K M L	N S T	N	E	..	..	B. myriocephala.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim. Bhutan. A(ka Hills).	D(aphla Hills). A(hor Hills, etc.) M(isimi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1495, bly— contl.</i>									
Melodinus monogynus	S	D A	..	..	H	..
Ecdysanthera micrantha	S	A D A	N	..	H	..
Marsdenia tinctoria	S	A	N	Y	H	..
Paraphlomis rugosa	S	A M	N	Y	H	..
Ficus pomifera	S	A	N	..	H	..
Panicum sarmentosum	S	A	N	..	H	..
<i>Distribution value 1520, gra.</i>									
Eupatorium Reevesii	S	..	B	A	..	..	H	J
Houttuynia cordata	S	..	S	A	..	Y	H	J
Miscanthus nepalensis	S	N	S	A	..	Y	H	J
<i>Distribution value 1562, d-II.</i>									
Rhamnus nepalensis	N	S B	A	N	..	..	..
Meliosma simplicifolia	N	S	A D A	N	..	..	..
Shuteria vestita	N	S	D A M	N	..	..	..
Anthocephalus indicus	N	S	A	..	..	..	..
Dioscorea anguina	N	S B	A	N	..	..	..
Panicum uncinatum	N	S	A	..	..	..	..
<i>Distribution value 1561, bri.</i>									
Sambucus javanica	S	A	N	Y	H	J
Campanumoca javanica	S B	A	..	Y	H	J
Litsea lanceifolia	S B	D A	N	..	H	J
<i>Distribution value 1599, bhef—</i>									
Gymnoperia acuminata	S B	A	N	Y	..	..
Amerphophallus bulbifer	S	A	..	Y	..	..
Rhaphidophora decursiva	S	A	N	Y	..	..
<i>Distribution value 1615, gre.</i>									
Ophiopogon wallichianus	S	N	S B	D A	N	Y	H	J
<i>Distribution value 1629, dlI.</i>									
Viola diffusa	N	S	A M	N	Y	H	..
Schima Noronhai	N	S B	D A	N	Y	H	..
Dioscorea febrifuga	N	S	D A	N	Y	H	..

SOUTHERN HALF.

Name.	Pacific.	Australia.	MALAY ISLANDS. J(ava), B(orneo), E(astern Islands).	MALAY PENINSULA. N(orth), E(ast), S(outh).	BURMA. N(orth), L(ower), S(han Hills), T(enasserim).	S.-E. ASSAM HILL- TRACTS. G(aro Hills), K(hasia Hills), C(achar Hills), N(aga Hills), M(anipur Hills), L(ushai and Chitta- gong).	PENINSULAR INDIA. C(eylon), M(alabar), N(orthern), E(astern).	AFRICA. T(ropical), M(ascarene).	America.
<i>M. monogyrus.</i>	E	N	..	L	..	..	..
<i>E. micrantha.</i>	J	N	N	K G	..	..	..
<i>M. tinctoria.</i>	J B E	N	N L S T	K	..	..	..
<i>P. rugosus.</i>	J B E	N	N	K	..	..	..
<i>F. pomifera.</i>	J B E	N E S	S T	K	..	..	..
<i>P. sarmentosum.</i>	J B E	N E S	N	L	..	..	..
<i>E. Raevsii.</i>	N	..	..	..
<i>H. cordata.</i>	K	..	..	..
<i>M. nepalensis.</i>	K N	..	..	..
<i>R. nepalensis.</i>	J	..	S	G N M	E	..	..
<i>M. simplicifolia.</i>	J	..	S T	K G N M L	E	..	..
<i>S. yoshida.</i>	E	..	L	K	E	..	..
<i>A. indiens.</i>	J B E	..	L	K M	E	..	..
<i>D. anguina.</i>	J	..	N	K G	M N E	..	..
<i>P. uncinatum.</i>	J	..	..	K N M	G M	..	..
<i>S. javanica.</i>	J B E	..	S	K N M	..	..	..
<i>G. javanica.</i>	J	..	S	K N	..	..	..
<i>L. lanceifolia.</i>	B	..	T	K G	..	..	..
<i>G. acuminata.</i>	L S	K	E	..	..
<i>A. bulbifer.</i>	L S	K	E	..	..
<i>R. decursiva.</i>	L	K	G M	..	..
<i>O. wallichianus.</i>	L S	K	E	..	..
<i>V. diffusa.</i>	E	..	S	K	E	..	..
<i>S. Noronhae.</i>	J B E	N E S	L S T	K	E	..	..
<i>D. febrifuga.</i>	J B E	N E	S	K	E	..	..

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim, Bhutan, Aka Hills).	Daphia Hills) A (bor Hills etc.), M (ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1629, dll— contd.</i>									
<i>Begonia lacinata</i>	N	S	D A M	N	..	H	..
<i>Blumea balsamifera</i>	N	S B	A	N	..	H	..
<i>Pratia nummularia</i>	N	S	D A	N	Y	H	..
<i>Torrenia edentula</i>	N	S B	A M	N	..	H	..
<i>Litsea citrata</i>	N	S B	A M	N	..	H	..
<i>Ficus hirta</i>	N	S	A	N	Y	H	..
<i>Distribution value 1635, blf.</i>									
<i>Millettia pachycarpa</i>	S	A	N	Y	H	..
<i>Achyropermum wallichianum</i>	S B	D A	N	Y	H	..
<i>Musa paradisiaca</i>	S	A	N	..	H	..
<i>Distribution value 1662, d-yl.</i>									
<i>Dillenia indica</i>	N		D A	N	..	..	..
<i>Ophiorrhiza argentea</i>	N	S	A	N	..	..	..
<i>Randia fasciculata</i>	N	S B	A	..	..	..	..
<i>Laportea crenulata</i>	N	S	A	N	..	..	..
<i>Distribution value 1675, g-ll.</i>									
<i>Dumasia villosa</i>	N S	N	S	A	N	..	..	..
<i>Mezoneuron cucullatum</i>	S	N	S	A	N	..	..	..
<i>Bauhinia purpurea</i>	N S	N	S	A	N	..	..	..
<i>Acacia Intsia</i>	N S	..	S	A	N	..	..	..
<i>Rauwolfia serpentina</i>	S	..	S	A	..	..	..	..
<i>Debregeasia longifolia</i>	S	N	S	A	N	..	..	..
<i>Eria flava</i>	S	N	S B	A	N	..	..	..
<i>Pholidota imbricata</i>	S	N	S B	A	N	..	..	..
<i>Geodorum purpureum</i>	S	..	S	A	N	..	..	..
<i>Ophlopogon intermedius</i>	N S	N	S	D A	N	..	..	..
<i>Distribution value 1681, bry.</i>									
<i>Paederia tomentosa</i>	S	A	N	Y	H	J
<i>Vitex heterophylla</i>	S	A	N	Y	H	J
<i>Distribution value 1682, blf.</i>									
<i>Sauropus macrophyllus</i>		D A M	N	Y	..	..

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM ILL- TRACTS G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chitta- gong).	BURMA. N(orth). L(ower). S(han Hills). T(ouasserim).	MALAY PENINSULA. N(orth). E(ast). S(south).	MALAY ISLANDS. J(ava). B(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	K N M	N S T	N E S	J	..	..	B. laciniata.
..	K L	N L S T	N E S	J B E	..	..	B. balsamifera.
..	K C N L	N S T	N	J B	..	..	P. nummularia.
..	K C N	N L S	N E	J	..	..	T. edentula.
..	G K N M	N L	N E	J B	..	..	L. citrata.
..	K C N	N L S T	N E S	J	..	..	F. hirta.
..	..	E	K C N M L	N S T	..	..	..	..	M. pachycarpa.
..	..	C M E	K N L	N L S	..	..	..	..	A. wallichianum.
..	..	E	....	N	..	..	..	..	M. paradisiaca.
..	..	C M E	....	N L	N E S	J B	..	..	D. indica.
..	..	G	L	N S T	N E	..	..	..	O. argentea.
..	..	E	K C	L T	N E S	..	..	..	R. fasciculata.
..	..	C M E	K C	N L T	N	J B E	..	..	L. crenulata.
..	..	C M E	K M	N L S	..	E	..	..	D. villosa.
..	..	M E	G K N L	N L	..	J E	..	..	M. cucullatum.
..	..	M N E	G K L	N L S	..	J E	..	..	B. purpurea.
..	..	C M E	K C L	N	..	J E	..	..	A. Intsia.
..	..	C M N E	K C	L T	..	J B E	..	..	R. serpentina.
..	..	C M N E	K L	N L S T	..	J E	..	..	D. longifolia.
..	..	E	....	N	..	E	..	..	E. flava.
..	..	C M E	K N L	N S T	..	J B E	..	..	P. imbricata.
..	..	M	C	N S	..	J	..	..	G. purpureum.
..	..	C M	K N M	N S	..	J	..	..	O. intermedium.
..	K N	N L	N	J E	..	..	P. tomentosa.
..	K	N L S	N	J	..	..	V. heterophylla.
..	..	M	N M L	N L S	..	J	..	..	S. macrophyllus.

NORTHERN HALF.

Name.	Distribution value 1893, dhy.	D	M	N	S	A	Y	H	II
<i>Dubautia sonneratioides</i>	Distribution value 1893, dhy.			N	S	A	Y		
<i>Massaenda macrophylla</i>				N	S	A	Y		
<i>Podocarpus nerilloia</i>				N	S	A	Y		
<i>Isachne albens</i>				N	S	A M	Y		
<i>Macropanax disperrum</i>	Distribution value 1705, ghl.			N	S B	A	Y		
<i>Alnus pteropoda</i>				N	S	A	Y		
<i>Diploclisia glaucescens</i>	Distribution value 1718, -III.					A	Y	H	
<i>Stemona tuberosa</i>						A	Y	H	
<i>Scirpus bernardensis</i>	Distribution value 1742, ghl.				S B	A	Y		II
<i>Ventilago maderaspatana</i>	Distribution value 1775, g-st.			N	S	A			
<i>Gouania leptocachya</i>					S	A			
<i>Vitis lanceolata</i>				N	S	D A			
<i>Biume membranacea</i>				N	S	A			
<i>Calliandra arborea</i>				N	S	D A			
<i>Paederia foetida</i>	Distribution value 1784, d-lm.			N	S	A			
<i>Bolanum ferrox</i>	Distribution value 1815, -1st.					A			H
<i>Panicum villosa</i>	Distribution value 1820, l-um.				S	A			
<i>Artelochia indica</i>	Distribution value 1825, d-ut.			N	S	A			
<i>Euclea chinia</i>	Distribution value 1834, dbel.			N	S B	A			

Europe and N. Africa.

N.-W. HIMALAYA, N. of 32° S. of 32°.

Central Nepal.

E. HIMALAYA, Sikkim, Dinan, A (as Hills).

Daphla Hills, A (for Hills, etc.), Mtsami Hills).

Durma North).

S.-W. China.

S.-E. China.

Japan.

SOUTHERN HALF.

America.		AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(aster). E(aster).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(ochin Hills). N(aga Hills). M(anipur Hills). L(ushai and Chitta- gong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(aster Islands).	Australia.	Pacific.	Name.
..	..	..	..	K C M L	N L S T	N	..	..	..	D. sonneratioides.
..	..	..	..	K M	N L S T	N	..	..	..	M. macrophylla.
..	..	..	..	K C L	L S T	N E S	J B E	..	..	P. nerifolia.
..	..	..	..	K C N	N	N E S	J B E	..	..	I. alban.
..	..	..	..	K M L	N S	..	J	..	..	M. dispernum.
..	..	..	..	K C N M	L S T	..	J	..	..	A. pteropoda.
..	..	C M	..	E L	L S T	..	J E	..	..	D. glaucescens.
..	..	..	..	K M L	..	..	E	..	..	S. tuberosa.
..	..	..	..	K M L	L T	..	J E	..	..	S. ternatensis.
..	..	C M N E	..	K	N L S T	E S	J	..	..	V. madersapatana.
..	..	..	E	K C L	N L S T	N E	J E	..	..	G. leptostachya.
..	..	C M E	..	K M L	N L T	N	J E	..	..	V. lanceolata.
..	..	C M E	..	G K L L	N L S T	N	J	..	..	B. membranacea
..	..	..	E	K N L	N L S T	N	..	..	..	C. arborea.
..	M	..	E	C N M	N S T	N E S	J B E	..	..	P. foetida.
..	..	C M	..	K L	N L S T	N E S	J B E	..	..	S. ferox.
..	..	M	C N E	K N L	L T	N E S	J B E	A	F	P. philipes.
..	..	..	C M E	..	L	..	E	A	P	A. indica
..	..	..	M	K N	N L S T	..	..	..	..	P. blanda.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim, Bhutan, Aka Hills).	D (apla Hills). A (bor Hills, etc.). M. Ishmi Hills).	Burma N (orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution valus 1842, gly.</i>									
<i>Adenocaulon longifolia</i>	S	..	S	D A	N	Y	H	..
<i>Symplocos javanica</i>	S	..	S	A	N	..	H	..
<i>Pouzolzia sanguinea</i>	N S	N	S	A	N	Y	H	..
<i>Distribution valus 1851, ghal.</i>									
<i>Polygonum capitatum</i>	N S	N	S B	A M	..	Y	..	..
<i>Distribution valus 1869, dlel.</i>									
<i>Buettneria aspera</i>	N	S B	A	..	..	H	..
<i>Distribution valus 1914, bhil.</i>									
<i>Sauropus androgynus</i>	S B	A	N	Y	..	..
<i>Distribution valus 1920, g-of.</i>									
<i>Crotalaria alata</i>	N S	N	S B	A M	N	..	..	..
<i>Albizia procera</i>	N S	..	S	A	..	..	..	..
<i>Trichosanthes cucumerina</i>	S	..	..	A	N	..	..	..
<i>Schefflera venulosa</i>	S	..	S	A	N	..	..	..
<i>Coffea bengalensis</i>	S	..	S B	A	N	..	..	..
<i>Distribution valus 1930, gri.</i>									
<i>Actinidia callosa</i>	S	N	S B	A	N	Y	H	J
<i>Marlea begoniaefolia</i>	N S	..	S	A	N	Y	H	J
<i>Polygonum Posumbu</i>	N S	..	S B	D A	..	Y	H	J
<i>Morus indica</i>	N S	..	S	A	N	Y	H	J
<i>Ficus foveolata</i>	N S	N	S B	A	N	Y	H	J
<i>Villebrunia rubescens</i>	N S	..	S	A	N	Y	H	J
<i>Distribution valus 1940, llu.</i>									
<i>Microglossa volubilis</i>	A	N	..	H	..
<i>Vandella pusilla</i>	A	N	..	H	..
<i>Distribution valus 1945, g-uf.</i>									
<i>Garnotia stricta</i>	S	N	S	A M	..	..	..	..
<i>Distribution valus 1945, ghef.</i>									
<i>Pentapanax Leschenaultii</i>	S	N	S B	A M	..	Y	..	..
<i>Gynura angulosa</i>	S	N	S	A	N	Y	..	..

SOUTHERN HALF.

Name.	Pacific.	Australia.	MALAY ISLANDS. J(ava). B(orneo). E(asterne Islands).	MALAY PENINSULA. N(orth). E(ast). S(outh).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	S.-E. ASSAM HILL-TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(asterne).	AFRICA. T(ropical). M(uscarhene).	America.
<i>A. longifolia.</i>	J B E	N E S	N L S T	K C N M L	..	..	..
<i>S. javanica.</i>	J E	N E	N T	K C N	..	..	..
<i>P. sanguinea.</i>	J B	N E S	S	K C N M L	..	..	..
<i>P. polistatum.</i>	K N M	..	..	..
<i>B. asperu.</i>	L T	K C L	..	..	..
<i>S. androgyuus.</i>	J B E	..	N L S T	K C	C M	..	..
<i>C. alata.</i>	J K A	S	N L S	K C M L	..	..	..
<i>A. procera.</i>	E A	..	L T	C N	..	..	..
<i>T. cucumeria.</i>	J B E A	N	S S	K C	C M N E	..	..
<i>R. venulosa.</i>	A A	N E	N L S T	K K N L	..	..	..
<i>C. bengalensis.</i>	..	A	J	..	T	K L	E	..	..
<i>A. callosa.</i>	J	..	S	K N M	..	..	..
<i>M. begoniaefolia.</i>	E	..	N L S	N	..	..	..
<i>P. Posumbu.</i>	E	..	..	K C N M	..	..	..
<i>M. Indica.</i>	J	..	N L	K K M	..	..	..
<i>F. foreolata.</i>	J B E	..	N	K N L	..	..	..
<i>V. rufescens.</i>	J B E	..	N L S T	K	..	..	..
<i>M. volubilis.</i>	J	N E	N L S T	K C N M	..	..	..
<i>V. fusilla.</i>	J B S	N E	N	C N	..	..	..
<i>G. striata.</i>	P	..	E	N	L	K	E	..	..
<i>P. Leschenaultii.</i>	S	K N M	C M	..	..
<i>G. anguosa.</i>	K N M	M	..	..

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(tikkim). B(utuan). A(ka Hills).	D(aphla Hills). A(bor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 1946, ghei— contd.</i>									
<i>Ajuga macroperma</i>	N S	..	S B	D A	N	Y	..	..
<i>Bellschmidia Roxburghii</i>	S	..		A	..	Y	..	..
<i>Urtica parviflora</i>	N S	N	S B	A	N	Y	..	..
<i>Distribution value 1950, blif.</i>									
<i>Ficus nervosa</i>	S B	A	..	..	H	..
<i>Phrynium capitatum</i>	S	D A	..	..	H	..
<i>Phrynium parvifolium</i>	S	A	N	..	H	..
<i>Distribution value, 1951, ghe.</i>									
<i>Cinnamomum Tamala</i>	N S	..	S B	A	N	Y	..	..
<i>Distribution value 1961, g-is.</i>									
<i>Rhabdia lycioides</i>	S	..	S	A	N	..	..	..
<i>Andropogon zizanioides</i>	N	N		A	N	..	..	..
<i>Distribution value 1962, ghei.</i>									
<i>Vitis beyrsana</i>	S	N	S	A	N	..	H	..
<i>Conyza japonica</i>	N	N S	N	S B	A	N	Y	H	..
<i>Bothriospermum tenellum</i>	S	N	S B	A	N	Y	H	..
<i>Plectranthus ternifolius</i>	N S	N	S B	A	N	Y	H	..
<i>Ficus Roxburghii</i>	N S	..	S B	A	N	..	H	..
<i>Pachystoma senilo</i>	S	..	S B	A	N	Y	H	..
<i>Distribution value 1964, gry.</i>									
<i>Pieris ovalifolia</i>	N S	N	S	A	N	Y	H	J
<i>Distribution value 1967, g-un.</i>									
<i>Spilanthes Aemella</i>	S	N	S	A	N	..	..	..
<i>Ervatamia divaricata</i>	S	N	S	A	N	..	..	..
<i>Leucas lavandulifolia</i>	S	N	S B	A	N	..	..	..
<i>Distribution value 2014, bhyl.</i>									
<i>Pothos scandens</i>	S	D A	N	Y	..	..
<i>Distribution value 2030, gry.</i>									
<i>Gynostemma pedatum</i>	S	N	S	D A	N	Y	H	J

SOUTHERN HALF.

America.		AFRICA. T(tropical). M(mascarene).		PENINSULAR INDIA. C(cydon). M(malabar). N(northern). E(eastern).		S.-E. ASSAM HILL-TRACTS. G(garo Hills). K(khasia Hills). C(cachar Hills). N(naga Hills). M(manipur Hills). L(lushai and Chittagong).		BURMA. N(northern). L(lower). S(southern Hills). T(tenasserim).		MALAY PENINSULA. N(northern). E(east). S(southern).		MALAY ISLANDS. J(java). B(borneo). E(eastern Islands).		Australia.	Pacific.	Name.				
..	..	..	E	K	N	L	N	L	S	..	..	..	..	..	A. macrosperma.
..	..	M	F	K	C	M	L	L	..	..	..	..	..	..	B. Roxburghii.
..	..	M	..	..	N	..	N	..	..	..	..	..	..	..	U. parviflora.
..	..	C	M	E	K	C	L	L	T	..	..	E	..	..	F. nervosa.	
..	..	C	M	E	K	C	N	M	L	S	..	J	E	..	P. capitatum.					
..	..	M	F	K	..	..	..	N	..	..	..	J	B	..	P. parvifolium.
..	..	..	..	..	..	..	..	N	..	..	..	..	..	..	G. Tanla.
A	I	C	M	N	E	K	N	L	N	L	S	T	..	..	R. lycioides.			
A	I	M	C	M	N	E	C	..	N	L	N	E	S	A. zizanioides.				
..	..	C	..	E	K	..	M	N	..	T	..	..	..	..	V. heyneana.	
..	..	M	..	E	K	C	N	N	..	S	T	..	..	..	C. japonica.		
..	..	..	N	E	K	..	M	N	..	..	..	..	..	..	B. tenellum.
..	..	..	..	E	G	K	N	M	N	S	..	..	..	..	P. ternstrolii.
..	..	..	..	E	K	C	M	L	N	L	..	..	..	..	F. Roxburghii.
..	..	M	..	E	K	..	M	N	..	..	..	..	..	..	P. senile.
..	..	..	..	..	K	..	N	N	..	..	N	E	..	..	P. ovalifolia.
..	T	M	C	M	N	E	K	..	M	L	N	L	S	N	J	B	E	S. Acmella.
..	T	K	C	M	L	N	L	S	T	N	E	..	E	E. divaricata.
..	..	M	M	N	E	K	C	M	L	N	N	S	J	B	E	L. lavandulifolia.
..	C	M	K	..	L	N	..	T	N	..	J	B	E	P. scandens.
..	K	..	N	M	N	S	N	..	J	B	G. pedatum.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA, S(ikkim), B(hutan), A(ka Hills).	D(ephia Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2050, blyf-</i>									
<i>Desmos chinensis</i>	S	A	N	..	H	..
<i>Lobelia affinis</i>	S	A	N	..	H	..
<i>Homonoia riparia</i>	S	A	N	..	H	..
<i>Tropidia angulosa</i>	S	A	N	..	H	..
<i>Saccharum arundinaceum</i>	?	..	S	A	..	Y	H	..
<i>Distribution value 2054, d-un.</i>									
<i>Melastoma malabathricum</i>	N	S B	A	N	..	..	..
<i>Distribution value 2062, dre.</i>									
<i>Saussurea affinis</i>	N	B	A	..	Y	H	J
<i>Distribution value 2142, g-en.</i>									
<i>Hibiscus vitifolius</i>	S	..	S	A	N	..	..	..
<i>Alstonia scholaris</i>	S	..	..	A	N	..	..	..
<i>Distribution value 2148, dhif.</i>									
<i>Polygonum runcinatum</i>	N	S	A	N	Y	..	..
<i>Distribution value 2167, g-un.</i>									
<i>Leea indica</i>	S	..	S	A	..	..	..	..
<i>Distribution value 2169, ghen.</i>									
<i>Boehmeria macrophylla</i>	S	N	S	A D A M	N	Y	..	..
<i>Distribution value 2175, gre.</i>									
<i>Lysimachia japonica</i>	N S	N	S B	A	N	Y	H	J
<i>Distribution value 2184, dhif.</i>									
<i>Naravella zeylanica</i>	N	S	A	N	Y	H	..
<i>Viola distans</i>	N	S B	A	..	Y	H	..
<i>Carex baccans</i>	N	S	A	N	Y	H	..
<i>Distribution value 2195, bief.</i>									
<i>Vitis repens</i>	S	A	N	..	H	..
<i>Ficus benjamina</i>	S	A	..	..	H	..
<i>Distribution value 2200, gru.</i>									
<i>Rhus semialata</i>	N S	N	S B	A	N	Y	H	J

SOUTHERN HALF.

Name.	Pacific.	Australia.	MALAY ISLANDS. J(ava). B(orneo). E(aster Islands).	MALAY PENINSULA. N(orth). E(ast). S(outh).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushaj and Chittagong).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(aster).n).	AFRACA. T(ropical). M(ascarene).	America.
<i>D. chinensis.</i>	J B E	N E S	N L S T	L	E	..	..
<i>L. affinis.</i>	J E	N E S	N S T	L	E	..	..
<i>H. riparia.</i>	J E	N E	N L S T	M L	E	..	..
<i>T. angulosa.</i>	E	N	N L	....	E	..	..
<i>S. arundinaceum.</i>	J B E	N E S	L	M L	E	..	..
<i>M. malabathricum.</i>	P	A	J B E	N E S	N L S T	K	E	M	..
<i>S. affinis.</i>	..	A	..	..	S	M L	..	..	..
<i>H. vitifolius.</i>	..	A	J	..	N S	....	E	T M	..
<i>A. scholaris.</i>	..	A	J D E	N E S	N L T	K G	E	T	..
<i>P. runcinatum.</i>	N	K N	E	..	..
<i>L. indica.</i>	P	A	J B E	N E S	L T	K	E	T M	..
<i>B. macrophylla.</i>	N S	K N	E	M	..
<i>L. japonica.</i>	J E	..	N S	K N M	..	..	..
<i>N. zeylanica.</i>	J	..	N L S T	K	E	..	..
<i>V. distans.</i>	J E	..	..	K G	E	..	..
<i>C. bacans.</i>	J E	..	N	K N	E	..	..
<i>V. repens.</i>	..	A	J B E	N E S	N L S T	K	E	..	..
<i>F. benjamina.</i>	..	A	J B E	N E S	L	N M L	E	..	..
<i>R. semialata.</i>	P	..	..	..	N S	K G N	..	..	..

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim), B(butan), A(ka Hills).	D(aphia Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2248, dhyf.</i>									
Dalbergia pinnata	N	S	A	N	Y	..	..
Dioscorea glabra	N	S B	A	N	Y	..	..
<i>Distribution value 2261, ghif.</i>									
Rubus lasiocarpus	N S	N	S	A	N	Y	..	..
Rubus ollipticus	N S	N	S B	A	N	Y	..	..
<i>Distribution value 2284, dlyf.</i>									
Amoora polystachya	N	S B	D A	N	..	H	..
Turpinia pomifera	N	S	D A	N	Y	H	..
Embelia Ribes	N	S	A	N	..	H	..
Styrax serrulatum	N	S	A	N	Y	H	..
Costus speciosus	N	S	A	N	..	H	..
Scleria elata	N	S	A	..	..	H	..
<i>Distribution value 2297, glif.</i>									
Desmodium Cephalotes	S	N		A	N	..	H	..
Heteropanax fragrans	S	N	S	D A	N	Y	H	..
Blumea laciniata	N S	..	S	D A	N	Y	H	..
Senecio scandens	S	N	S	D A M	N	Y	H	..
Rungia parviflora	S	N	S	A	..	..	H	..
Goodyera procera	S	N	S	D A	N	..	H	..
Commelyna obliqua	N S	N	S	A	N	Y	H	..
Carex flicina	N S	N	S	A	N	Y	H	..
<i>Distribution value 2316, blys.</i>									
Solanum torvum	S	A	N	..	H	..
<i>Distribution value 2361, ghlyf.</i>									
Clematis gauriana	N S	N	S	A	N	Y	..	..
Maca indica	S	N	S	A	N	Y	..	..
<i>Distribution value 2383, brel.</i>									
Carex rara	S B	A	..	Y		J
<i>Distribution value, 2397, glyf.</i>									
Hiptage Madablota	N S	..	S	A	..	..	H	..
Toddalea asiatica	S	..	S	A A	N	..	H	..

SOUTHERN HALF.

America.		AFRICA. T (Tropical). M (Masarene).		PENINSULAR INDIA. C (Ceylon). M (Malabar). N (Northern). E (Eastern).		S.-E. ASSAM HILL-TRACTS. G (Garo Hills). K (Khasia Hills). C (Cachar Hills). N (Naga Hills). M (Manipur Hills). L (Lushai and Chittagong).		BURMA. N (North). L (Lower). S (Shan Hills). T (Tenasserim).		MALAY PENINSULA. N (North). E (East). S (South).		MALAY ISLANDS. J (Java). B (Borneo). E (Eastern Islands).		Australia.	Pacific.	Name.							
..	..			E		K	N	L	N	L	T	N	E	J	B	E	..	..	D. pinnata.		
..	..			E		K	C		L	N	L	S	T	N			..	..	D. glabra.		
..	..	C	M			K		N	M	L	N	L	S	..	J		..	..	R. lasiocarpus.		
..	..	O	M	E		K	G	N	M	L	N	L	S	T	..	E	..	..	R. ellipticus.		
..	..	O	M	E	G	K	O		L	N	L	S	T	N	S		E	A. polystachya.			
..	..	O	M			K	O	N	L	N	L	S	N	S	J	B	E	T. pomifera.			
..	..	G	M					N	M	L	N	L	S	T	N	E	S	J	B	E. Ribes.	
..	..			E		K	O	N	M	L	N	S	T	N			J	B	E	S. serrulatum.	
..	..	C	M	N	E	K	O	N		N	L	N	E	S	J	B	E	O. speciosus.			
..	..	O	M			K	C	N	M			N		J	B	E	..	..	S. elata.		
..	..	C	M	N	E	K			L	N	L	S	..	J			..	..	D. Cephalotes.		
..	..			E					L	N	L	S	T	..	J		..	..	H. fragrans.		
..	..			E		K				N	L	T	..	J	E	..	..	B. laciniata.			
..	..	C	M			K		N	M	N	S	..	..	E	..	..	..	S. scandens.	
..	..	O	M	N	E				M	L	S	..	..	E	..	..	..	R. parviflora.	
..	..	O	M	E		K		N	M	L	N	L	S	..	J		..	..	G. proocera.		
..	..	O	M	E		K		N		N		..	..	J	B	..	..	C. obliqua.	
..	..	C	M			K	N		L	N	L	T	..	J	B	E	..	..	C. filicina.		
W	T	O	E			K	C		M	L	N	L	S	T	N	E	S	J	B	E	S. torvum.
..	..	O	M	E		K				N	S	T	N	J	E	..	..	..	O. gauriana.	
..	..	O	M	E		K		N	M	L	N	L	S	T	N	J	B	E	M. indica.		
..	..	O				K				..	..	..	..	B	E	A	..	..	C. rara.
..	..	G	M	N	E				L	L	S	T	N	E	J	B	E	H. Madagblota.			
..	..	O	M	E		K	C	N	M	L	N	L	S	T	N	E	S	J	B	E	T. asiatica.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills).	D(ephla Hills). A(bor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2397, glyf— contd.</i>									
<i>Desmodium laxiflorum</i>	..	S	..	S	A	N	..	H	..
<i>Flemingia congesta</i>	..	N S	N	S	A	N	Y	H	..
<i>Momordica dioica</i>	..	N S	..	S	A	N	Y	H	..
<i>Hedyotis hispida</i>	..	N S	..	S	A	N	..	H	..
<i>Blumea glomerata</i>	..	S	N	S B	A	N	Y	H	..
<i>Buddleia asiatica</i>	..	N S	N	S B	D A M	N	Y	H	..
<i>Vandellia cordifolia</i>	..	N S	..	S	A	N	..	H	..
<i>Ocxyllum indicum</i>	..	S	N	S B	A	N	Y	H	..
<i>Anisomeles indica</i>	..	N S	..	S	A	N	Y	H	..
<i>Litsea polyantha</i>	..	N S	..	S	D A	N	Y	H	..
<i>Ficus gibbosa</i>	..	S	..	S R	D A	..	..	H	..
<i>Ficus heterophylla</i>	..	S	..	S	A	N	..	H	..
<i>Elatostema lineolatum</i>	..	S	N	S	A	..	Y	H	..
<i>Salix tetrasperma</i>	..	N S	..	S	A	N	Y	H	..
<i>Eragrostis amabilis</i>	..	N S	N	S	A	..	..	H	..
<i>Distribution value 2429, Alef.</i>									
<i>Irena orientalis</i>	N	..	A	N	..	H	..
<i>Curculigo recurvata</i>	N	..	A	N	..	H	..
<i>Distribution value 2442, blun.</i>									
<i>Cynthula prostrata</i>	S	A	N	..	H	..
<i>Centotheca lappacea</i>	S	A	N	..	H	..
<i>Distribution value 2454, dluf.</i>									
<i>Micromelum pubescens</i>	N	S	D A	N	..	H	..
<i>Ischaemum rugosum</i>	N	S	A	N	..	H	..
<i>Distribution value 2456, gras.</i>									
<i>Polygonum virginianum</i>	..	N S	..	S	A	N	Y	H	J
<i>Distribution value 2472, dryf.</i>									
<i>Symplocos spicata</i>	N	S	A	..	Y	H	J
<i>Distribution value 2481, bios.</i>									
<i>Ichnanthus pallens</i>	S	A	..	..	H	..

SOUTHERN HALF.

America.	AFRICA. Tropical. M(ascarene).	PENINSULAR INDIA. Ceylon M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL-TRACTS. Garro Hills. K(hasia Hills) C(achar Hills). S(han Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	..	M E	K O N	N L S	S	J E	..	..	D. laxiflorum.
..	..	G M E	K	N L S T	N E S	J B E	..	..	F. congesta.
..	..	C M N E	K C N L	N L S	N E S	J B E	..	..	M. dioica.
..	..	E	O N	N L	N E S	J B	..	..	H. hispida.
..	..	M N E	G K N	N L S T	N	J E	..	..	B. glomerata.
..	..	M N E	K C N M L	N L S T	N	J B E	..	..	B. asiatica.
..	..	O M N E	K C N M L	N L S T	N	B E	..	..	V. cordifolia.
..	..	C M N E	C L	N L S T	N E S	J E	..	..	O. indicum.
..	..	N E	K C L	N S T	N	B E	..	..	A. indica.
..	..	M N E	C M L	N S T	N E	J B E	..	..	L. polyantha.
..	..	O M N E	K L	L	N E	J B E	..	..	F. gibbosa.
..	..	O M	L	N L S	N E S	J	..	..	F. heterophyllum.
..	..	C M	K N	L T	N E	..	..	..	E. lineolatuma.
..	..	M N E	G K N M	N L S T	N E	J E	..	..	S. tetrasperma.
..	..	C M N E	..	S T	N E S	J B E	..	..	F. amabilis.
..	..	C M N E	G K O N L	N L S T	N E S	J D E	A	..	T. orientalis.
..	..	O E	K N M L	N L S T	N S	J B E	A	..	C. recurvata.
..	T M	O M	K C M L	N L S T	..	J B E	..	P	O. prostrata.
..	T	O M	K M	N L S T	N E S	J D E	A	P	C. lappacea.
..	..	O E	K O N M L	N L S T	N S	J E	A	P	M. pubescens.
..	..	C N E	..	N S	N S	J B E	..	P	I. rugosum.
..	N M	N	..	..	..	..	P. virginianum.
..	..	O M E	K O L	T	N E	J B E	..	..	S. spicata.
W	T	O	G K	..	..	B E	..	..	I. pallens.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills).			Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2483, chin.</i>										
Girardinia heterophylla	N S	N	S		A	N	Y	..	..
<i>Distribution value 2485, grif.</i>										
Diosmolum parviflorum	N S	N	S		A	N	Y	H	J
Fragaria indica	N S	N	S B		D A	N	Y	H	J
Potentilla kleiniana.	N S	N	S		[A]	N	Y	H	J
Melothria perpusilla	S	N	S		[A]	N	..	H	J
Balanocnida chinensis	S	N			[A]		Y	H	J
Disporum pullum	S	N	S		[A]	N	Y	H	J
Andropogon assimilis	N S	N	S		D A	N	Y	H	J
<i>Distribution value 2506, dyn.</i>										
Ilysanthes ciliata	N	S		A	N	..	H	..
<i>Distribution value 2508, blus.</i>										
Paspalum conjugatum	S		[A]	..	..	H	..
<i>Distribution value 2519, glim.</i>										
Veronica javanica	S		S B		[A]	..	Y	H	..
Fimbristylis junciformis	N S	N			[A]	..	..	H	..
<i>Distribution value 2531, ghuf.</i>										
Eurya acuminata	S	N	S B		D A	N	Y	..	..
Dioscorea pentaphylla	S	N	S B		A M	N	Y	..	..
<i>Distribution value 2542, glaf.</i>										
Bombax malabaricum	N	N	S B		A M	N	Y	H	..
Abroma fastuosa		S	N	S		A	N	..	H	..
Centranthera hispida		N S				A	N	..	H	..
Ficus hispida	N S	..	S		A	..	..	H	..
Pouzolzia hirta	N S	..	S		A	N	Y	H	..
Sporobolus diander	N S	N	S		D A M	..	Y	H	..
<i>Distribution value 2546, thif.</i>										
Cyperus niveus	E	N S	N	S		A	N	Y	..	..

SOUTHERN HALF.

America.	AFRICA. T(tropical). M(mascarene).	PENINSULAR INDIA. C(eylon). M(sabar). N(orthern). E(asterne).	S.-E. ASSAM HILL- TRACTS. G(aro Hills) * K(hasia Hills). C(achar Hills). N(aga Hills). Manipur Hills. L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(asterne Islands).	Australia.	Pacific.	Name.
..	T	O M E	K N L	N L S		J	..	..	G. heterophylla.
..	..	O M E	K N	N L		J	..	..	D. parviflorum.
..	..	M	K N M	N S T		J E	..	..	F. indica.
..	..	G M E	K N	N S		J	..	..	P. kleiniana.
..	..	C M N E	K C N M L	N T		J E	..	..	M. perpusilla.
..	..	E	K C N			E	..	..	B. chinensis.
..	..	E	K N M	N		J	..	..	D. pullum.
..	..	M N E	G K C N M	N L S		J E	..	..	A. assimili.
..	M	M	K C M	N L S T	N E S	B E	..	..	I. ciliata.
W	T	C	C	..	N E S	J B E	..	..	P. conjugatum.
..	T M	M	K N M	..	..	J B	..	..	V. javanica.
..	M	C M N	K	L	..	J B E	..	..	F. junciformis.
..	..	C	K C N L	N L S T	N E S	J B E	A	P	E. acuminata.
..	..	G M N E	K C N L	N L S T	N E	J B E	A	P	D. pentaphylla.
..	..	O M N E	C	N L S T		J E	A	..	B. malabaricum.
..	..	E	K	N	N E S	J B E	A	..	A. festuosa.
..	..	C M E	C	L	I S T	N E	J B E	A	C. hispida.
..	..	C M N E	C	L	L S T	N E	J B E	A	F. hispida.
..	..	E	K C	N S T	..	J B E	A	..	P. hirta.
..	..	C M N E		L	L	N E S	J B E	A	S. diander.
..	..	N E	....	N	..	B E	..	..	Cyperus niveus.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. S(ikkim). B(hutan). A(ka Hills).	D(ephla Hills). A(boor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2567, gluf.</i>									
<i>Glycosmis cochinchinensis</i>	..	S	..	S	A	N	Y	H	..
<i>Ilysanthes centipeda</i>	..	S	N	S	A	N	Y	H	..
<i>Blechnia javanica</i>	..	S	N	S B	A	..	Y	H	..
<i>Liparis longipes</i>	..	S	..	S B	D A	N	Y	H	..
<i>Anellema malabaricum</i>	..	N S	N	S	A	..	Y	H	..
<i>Floscopa scandens</i>	..	N S	N	S	A	N	..	H	..
<i>Themeda gigantea</i>	..	S	N	S	A M	N	Y	H	..
<i>Distribution value 2582, tlif.</i>									
<i>Sonchus arvensis</i>	E	N S	N		A	..	Y	H	..
<i>Distribution value 2583, ghyu.</i>									
<i>Acacia pennata</i>	..	S	N	S	A	N	Y	..	..
<i>Bridelia stipularis</i>	..	N S	N	S B	A	N	Y	..	..
<i>Distribution value 2585, gryf.</i>									
<i>Polygonum chinense</i>	..	S	N	S B	D A M	N	Y	H	..
<i>Caltha tetrandra</i>	..	S	..	S	A	N	Y	H	J
<i>Pouzolzia pentandra</i>	..	N S	N	S	A	N	Y	H	J
<i>Distribution value 2619, glyn.</i>									
<i>Atylosia scarabaeoides</i>	..	N S	N	S	A	N	..	H	..
<i>Solanum indicum</i>	..	N S	N	S	A	N	Y	H	..
<i>Justicia Gendarussa</i>	..	S	..	S	A	N	..	H	..
<i>Carex cruciata</i>	..	S	N	S B	A M	N	Y	H	..
<i>Trifolium madagascariensis</i>	..	N S	..	S	D A M	N	Y	H	..
<i>Distribution value 2676, dlun.</i>									
<i>Stephania hernandiifolia</i>	N	S	A	N	Y	H	..
<i>Distribution value 2683, glye.</i>									
<i>Lophocarpus guianensis</i>	..	N	..		A	..	..	H	..
<i>Distribution value 2707, grin.</i>									
<i>Cynoglossum micranthum</i>	..	N S	..	S	A	N	Y	H	J
<i>Aerua scandens</i>	..	N S	..	S B	A	N	..	H	J
<i>Polygonum alatum</i>	..	N S	N	S B	A	N	Y	..	J
<i>Panicum plicatum</i>	..	N S	N	S	A M	N	Y	H	J

SOUTHERN HALF.

America.	AFRICA. T(tropical). M(mascarene).	PENINSULAR INDIA. C(ceylon). M(malabar). N(northern). E(eastern).	S.-E. ASSAM HILL-TRACTS. G(garo Hills). K(khasia Hills). C(cachar Hills). N(naga Hills). M(manipur Hills). L(lushai and Chittagong).	BURMA. N(north). L(lower). S(southern Hills). T(tenasserim).	MALAY PENINSULA. N(north). E(east). S(south).	MALAY ISLANDS. J(java). B(borneo). E(eastern Islands).	Australia.	Pacific.	Name.
..	..	C M E	K L	N L S T	N E S	J B E	A P		<i>G. cochinchinensis.</i>
..	..	C M N E	K M	N L S T	N E S	J B E	.. P		<i>I. centipeda.</i>
..	..	M E	K L	S T	..	J E	A P		<i>B. javanica.</i>
..	..	C M	K N M L	N S T	N	B	.. P		<i>L. longipes.</i>
..	..	C M N E	K C N M	L S	N E S	J B E	.. P		<i>A. malabaricum.</i>
..	..	C M E	M L	N	N S	J B E	A P		<i>F. scandens.</i>
..	..	E	....	N S	N E S	J B E	A P		<i>T. gigantea.</i>
..	..	M	K	..	..	E	.. ..		<i>S. arvensis.</i>
..	T	C M N E	K C N M L	N L S T	N E S	J B E	.. ..		<i>A. pennata.</i>
..	T	C M E	G K L	N L S T	N E S	J B E	.. ..		<i>B. stipularis.</i>
..	..	C M E	G K C N M L	N L S T	N	E	.. ..		<i>P. chinense.</i>
..	..	M	G K M L	N L S T	N E S	E	.. ..		<i>C. tetrandra.</i>
..	..	M E	G K C N L	N L S T	N E S	J B E	.. ..		<i>P. pentandra.</i>
..	M	C M N E	K	N S	N	J E	.. ..		<i>A. scarabeoides.</i>
..	T M	C M N E	K L	N L S T	N E S	J E	.. ..		<i>S. indicum.</i>
..	T M	C E	K N L	N L S T	N E S	J B E	.. ..		<i>J. Gendarussa.</i>
..	M	E	K C N	N L S T	N	B E	.. ..		<i>C. cruciata.</i>
M	T M	..	K L	N L	N	E	.. ..		<i>T. madagascariensis.</i>
..	T	C M E	K N L	N L S	N E S	J B E	A P		<i>S. bernandifolia.</i>
W	T M	..	....	L	N	J	.. ..		<i>L. guineensis.</i>
..	E	O	K N	N	..	J	.. ..		<i>C. micranthum.</i>
..	T	M N E	L	N T	..	J E	.. ..		<i>A. scandens.</i>
..	T M	C M E	K N M L	N S T	..	J E	.. ..		<i>P. alatum.</i>
..	T M	C M E	K N L	N L S	..	J B E	.. ..		<i>P. plicatum.</i>

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. S(Ikkim), B(hutan), A(ka Hills).	D(aphis Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2730, prog.</i>									
<i>Trichosanthes palmata</i>	..	S	..	S	A	N	..	..	J
<i>Dopatrium junceum</i>	..	S	..	S	A	N	Y	H	J
<i>Pogonatherum saccharoides</i>	..	N S	N	S	A	N	Y	H	J
<i>Distribution value 2740, diu.</i>									
<i>Cyperus diffusus</i>	N	S	A	..	..	H	..
<i>Distribution value 2755, graf.</i>									
<i>Mollugo stricta</i>	..	N S	N	S	A	N	Y	H	J
<i>Conyza viscidula</i>	..	S	N	S	D A M	N	Y	H	J
<i>Artemisia vulgaris</i>	..	N S	N	S	A M	N	Y	H	J
<i>Distribution value 2764, glon.</i>									
<i>Zisypus Jujuba</i>	..	N S	N	..	A	N	Y	H	..
<i>Smithia sensitiva</i>	..	S	N	S	A	N	..	H	..
<i>Blumea lacera</i>	..	S	..	S	D A	..	..	H	..
<i>Cordia subcordata</i>	..	N S	N	S	A	N	..	H	..
<i>Distribution value 2770, trif.</i>									
<i>Viola Patrinii</i>	E	N S	..	S B	A	N	Y	H	J
<i>Distribution value 2771, gris.</i>									
<i>Boehmeria platyphylla</i>	..	N S	N	S	A	N	Y	H	J
<i>Distribution value 2786, glun.</i>									
<i>Murraya exotica</i>	..	S	..	S	A	N	..	H	..
<i>Cassia tora</i>	..	N S	N	S B	A	N	..	H	..
<i>Melothria maderaspatana</i>	..	N S	..	S	A	N	Y	H	..
<i>Vernonia cinerea</i>	..	N S	N	S	A	N	..	H	..
<i>Plumbago zeylanica</i>	..	N S	N	S	A	N	Y	H	..
<i>Physalis minima</i>	..	N S	..	S	A	..	Y	H	..
<i>Ocimum basilicum</i>	..	N S	..	S	A	N	Y	H	..
<i>Deeringia aparanthoides</i>	..	N S	N	S B	A M	N	Y	H	..
<i>Amarantus spinosus</i>	..	N S	N	S	A	N	Y	H	..
<i>Amarantus viridis</i>	..	N S	..	S	A	N	..	H	..
<i>Amarantus polygamus</i>	..	N S	..	S	A	..	Y	H	..
<i>Polygonum barbatum</i>	..	N S	N	S B	A	N	Y	H	..

SOUTHERN HALF.

Name.	Pacific.	Australia.	MALAY ISLANDS. J(ava). B(orneo). E(aster Islands).	MALAY PENINSULA. N(orth). E(ast). S(outh).	BURMA. N(orth). L(ower). S(han Hills). T(enasserim).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chitta- gong).	PENINSULAR INDIA. C(ylon). M(alabar). N(orthern). E(asternd).	AFRICA. T(ropical). M(ascarene).	America.
<i>T. palmata.</i>	..	A	J D E	N	N L S	K C M	C M E	..	..
<i>D. junceum.</i>	..	A	E	..	N	K	E	..	..
<i>P. saccharoidesum.</i>	..	A	J B E	N E S	N S	K C	C M E	..	..
<i>C. diffusus.</i>	P	..	J B E	N E S	L	K C N	C M	T M	W
<i>M. stricta.</i>	P	A	J B E	N E S	S	G K C	C M N E E	..	..
<i>C. viscidula.</i>	P	A	J E	..	N S	K	C M E	..	..
<i>A. vulgaris.</i>	P	A	J E	N S T	N S T	K C N	C M	..	..
<i>Z. Jujuba.</i>	..	A	J	N	N L S	C	C M N E E	T M	..
<i>S. sensitiva.</i>	..	A	J	N	N S	K	C M N E E	T M	..
<i>B. lacera.</i>	..	A	J	N E S	T	K N	C M E	T M	..
<i>C. subcordata.</i>	..	A	J	N E S	N L S T	K	C M N E E	T M	..
<i>V. Pakihli.</i>	..	..	J	..	N S	K C N	C M E	..	..
<i>B. platyphylla.</i>	..	..	J B E	N	S T	K C N	C M N E E	T M	W
<i>M. exotica.</i>	P	A	J	N S	T	L	C M N N E	M	..
<i>C. tosa.</i>	P	..	J B E	N	N L S	K	C M N N E	T M	..
<i>M. maderaspatana.</i>	P	A	J B E	N E S	N L S	K C N	C M N N E	T M	..
<i>V. chinensis.</i>	P	A	J B E	N E S	S	K	C M N N E	T M	..
<i>P. zeylanica.</i>	P	A	J B E	N E S	S T	K	C M N E	T	..
<i>P. mihima.</i>	P	A	J B E	N E S	S	M	C M N E	T	..
<i>O. basilicum.</i>	P	..	J B E	N E S	N L S	K C	C M E	T	..
<i>D. amarantoides.</i>	P	A	J E	N	S	K C	C M N E	T	..
<i>A. spinosus.</i>	P	..	J B E	N E S	N L S T	K C N	C M E	T M	..
<i>A. viridis.</i>	P	..	J B E	..	N	C N	C M E	T	..
<i>A. polygamus.</i>	P	A	J B E	N E S	N	K	C M N E E	T M	..
<i>P. barbaticum.</i>	P	A	J B E	S	N L S T	K C N M L	C M N N E	T	..

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA, N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA, Sikkim, Bhutan, A(ka Hills).	D(sphla Hills), A(bor Hills, etc.), M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2786, glun— contd.</i>									
<i>Oudrania javanica</i>	S	..	S	D A	N	Y	H	..
<i>Lecanthus peduncularis</i>	N S	N	S	A	N	Y	H	..
<i>Thysanolaena maxima</i>	S	N	S	D A	N	Y	H	..
<i>Coix Lachryma-Jobi</i>	N S	N	S B	A	N	Y	H	..
<i>Andropogon acicularis</i>	S	N	S	A	N	..	H	..
<i>Distribution value 2792, ghos.</i>									
<i>Cissampelos Parala</i>	N S	N	S B	A	N	Y	..	..
<i>Distribution value 2807, gryn.</i>									
<i>Hydrocotyle rotundifolia</i>	S	N	S	A	N	Y	H	J
<i>Xanthium Strumarium</i>	N S	..	S B	A	N	..	H	J
<i>Celosia argentea</i>	N S	N	S	A	N	..	H	J
<i>Distribution value 2828, glos.</i>									
<i>Drymaria cordata</i>	N S	N	S	D A M	N	Y	H	..
<i>Corchorus acutangulus</i>	N S	..	S	A	N	..	H	..
<i>Emilia sonchifolia</i>	S	N	S	A	N	Y	H	..
<i>Solanum verbascifolium</i>	N S	N	S	A	N	Y	H	..
<i>Distribution value 2853, glus.</i>									
<i>Sida rhombifolia</i>	N S	N	S	A	N	Y	H	..
<i>Urena lobata</i>	N S	N	S	A	N	Y	H	..
<i>Hibiscus Atelmoschus</i>	S	..	..	A	..	..	H	..
<i>Triumfetta Bartramia</i>	S	N	S	A	N	..	H	..
<i>Centella asiatica</i>	S	..	S	A	..	..	H	..
<i>Adenostemma Lavenia</i>	N S	..	S	A	N	Y	H	..
<i>Siegesbeckia orientalis</i>	N S	N	S	A M	N	Y	H	..
<i>Achyranthes aspera</i>	S	N	S	A	N	Y	H	..
<i>Peperomia reflexa</i>	S	N	S	A	N	Y	H	..
<i>Colocasia esculenta</i>	S	N	S	A	N	Y	H	..
<i>Kyllingia brevifolia</i>	N S	N	S	A	..	Y	H	..
<i>Distribution value 2871, grys.</i>									
<i>Nasturtium indicum</i>	N S	..	S	A	N	Y	H	J
<i>Amarantus gangeticus</i>	S	..	..	A M	N	Y	H	J

SOUTHERN HALF.

America.		PENINSULAR INDIA.		S.-E. ASSAM HILL-TRACTS.		BURMA.		MALAY PENINSULA.		MALAY ISLANDS.		Australia.		Pacific.		Name.										
AFRICA. T(ropeal). M(ascarene).		C(eylon). M(alabar). N(orthern). E(aster).)		G(aro Hills). K(hasia Hills). C(hachar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).		N(orth). L(ower). S(han Hills). T(enserim).		N(orth). E(ast). S(outh).		J(ava). B(orneo). E(aster Islands).																
..	T	C	E		L	N	S	N		J	E	A	P			C. javanica.										
..	T	C	M	N		K	M	N	L	S	T			J	B	E	A	P	L. peduncularis.							
..	M		M	N	E	K	C	N	M	L		N	E	J	E	A	P		T. maxima.							
..	T	M	C	M	N	E	K	C			N	L	S	T	N	S	J	B	E	..	P	C. Lachryna-Jobi.				
..	M	C	M	E		K	C				N	L	S	N	E	S	J	B	E	A	P	A. acicularis.				
W	T	M	C	M	N	E	K	N	M		N	L	S	T				B	E	A	..		C. Pareira.			
..	T	C	M			K		N	S		N	E	S	J	E		..	..	..	..	..	..	H. rotundifolia.		
..	T	M	C	E		K	C		L		N	E	S					B		..	..	..	X. Strumarium.		
..	T	C	M	N	E			M			N	L	S	T	N	E	S	J	B	E	..	..		C. argentea.	
W	T	M	C	M	E	K	N				N	S		..			J	E	A	..			D. cordata.			
W	T	C	M	E				M			N	L	S	T	N	E	S	J	E	A	..			C. acutangulus.		
W	T	M	C	M	N	E	K	C			N	S	T	N	E	S	J	B	E	A	..			E. sonchifolia.		
W	T	C	M	E				M			N	L	S	T	N	E	S	J	B	E	A	..			S. verbascifolium.	
W	T	M	C	N	E	K	M				N	L	S	T	N	E	S	J	B	E	A	P			S. rhombifolia.	
W	T	M	C	M	N	E	K	C	L		N	L	S	T	N	E	S	J	B	E	A	P			U. lobata.	
W	T	M	C	M	E			L				S		N	E	S	J	B	E	A	P			H. Abelmoschus.		
W	T	M	C	M	N	E			R		N	L			N	E	S	J	B	E	A	P			T. Bartramia.	
W	T	M	C	M	E	K	N				L	S		N	S		J	B	E	A	P			C. asiatica.		
W	T	M	C	M	N	E	K	N			N	S		N	E	S	J	B	E	A	P				A. Lavenia.	
W	T	M	C	M	E	K	C	N	L		N	S		E	S		J	E	A	P				S. orientalis.		
W	T	M	C	M	N	E		C			N			N	E	S	J	B	E	A	P				A. aspera.	
W	T	M	C	M	E	K	N	M			N	S		..				E	A	P					P. reflexa.	
W	T			E		K	C				N	L	S	T	N	E	S	J	B	E	..	P				O. esoulenta.
W	T	M	C	M	E	K	N				L	T		N	S		J	B	E	..	P					K. brevifolia.
W	T	C	M	N		K	N	L			L						J	E					F. Indicum.
W	T	M	C	M	N	E	K				N	L	S	T	N		J	B	E					A. gangeticus.

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32° S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim, Bhutan, A(ka Hills).	D(apha Hills). A(bor Hills, etc.). M(ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 2904, tlyn.</i>									
<i>Dichrocephala latifolia</i> . . .	E	S	N	S	A	N	Y	H	.
<i>Distribution value 2962, gron.</i>									
<i>Rubus rosmifolius</i> . . .	..	S	..	S B	D A	N	..	H	J
<i>Hydrocotyle javanica</i> . . .	..	N S	N	S B	A	N	..	H	J
<i>Panicum indicum</i> . . .	..	S	N	S	A	..	Y	H	J
<i>Distribution value 2977, grun.</i>									
<i>Crepis japonica</i> . . .	..	S	..	S	A	..	Y	H	J
<i>Elatostema sessile</i> . . .	..	N S	N	S	D A	N	Y	H	J
<i>Dioscorea bulbifera</i> . . .	..	N S	N	S	A	N	Y	H	J
<i>Distribution value 2992, trin.</i>									
<i>Sanicula europæa</i> . . .	E	N S	N	S B	A	N	Y	H	J
<i>Distribution value 3040, traf.</i>									
<i>Spiranthes australis</i> . . .	E	N S	..	S B	A	..	Y	H	J
<i>Distribution value 3041, grus.</i>									
<i>Hypericum japonicum</i> . . .	..	S	N	S	A	..	Y	H	J
<i>Bidens pilosa</i> . . .	..	N S	N	S	A	..	Y	H	J
<i>Mariscus sieberianus</i> . . .	..	N S	..	S	A M	N	Y	H	J
<i>Oplismenus compositus</i> . . .	..	N S	N	S	A	N	Y	H	J
<i>Sporobolus indicus</i> . . .	..	N S	..	S	A M	N	Y	H	J
<i>Distribution value 3049, tion.</i>									
<i>Nymphaea stellata</i> . . .	E	N S	..		A	N	..	H	..
<i>Distribution value 3074, Mun.</i>									
<i>Wolffia Michellii</i> . . .	E	..	..		A	N	..	H	..
<i>Distribution value 3108, thus.</i>									
<i>Juncus bufonius</i> . . .	E	N	..	S	A	..	Y	..	..
<i>Distribution value 3113, tlos.</i>									
<i>Scirpus setaceus</i> . . .	E	N S	..	S	A	..	Y	H	..
<i>Panicum Crus-galli</i> . . .	E	N S	N	S	A	N	Y	H	..

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). L(ower). S(nan Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). B(orneo). E(astern Islands).	Australia.	Pacific.	Name.
..	T	C M	K C N	N S	N	J B E	..	..	<i>L. latifolia.</i>
..	M	..	K N L	N L S T	N E	J B E A	..	..	<i>R. rosæfolius.</i>
..	T	G M	K C N M L	N S	N E	J B E A	..	..	<i>H. javanica.</i>
..	T	C M E	N M	..	N E S	J B E A	..	..	<i>P. indicum.</i>
..	T M	C M E	C	S	N S	J B E A	P		<i>C. japonica.</i>
..	T M	C M	K C N M	N L S T	N E S	J E A	P		<i>E. sessile.</i>
..	T M	C M N E	K C N, L	N L S T	N E S	J B E A	P		<i>D. bulbifera.</i>
W	T M	C M N	K N M	N S	..	J B E	..	..	<i>S. europæa.</i>
..	..	C M	K N L	S	..	J B E A	..	..	<i>S. australis.</i>
W	M	C M E	K N	S	N S	J B E A	P		<i>H. japonicum.</i>
W	T M	C M E	K N L	N S	N E S	J B E A	P		<i>B. pilosa.</i>
W	T M	C M E	K	L T	N E S	J B E	..	P	<i>M. siberianus.</i>
W	T M	C M E	N	N L S	N E S	J B E A	P		<i>O. compositus.</i>
W	T M	C M E	K N	N L S T	N E S	J E A	P		<i>S. indicus.</i>
..	T M	C M N E	L	N L	N E	J B E A	..	..	<i>N. stellata.</i>
..	T M	M E	....	N L	N E S	J E A	P		<i>W. Michellii.</i>
W	T	..	....	..	..	A	P		<i>J. bufonius.</i>
W	T	..	....	..	..	J E A	..	..	<i>S. setaceus.</i>
W	T	C N E	....	N S T	N E S	J E A	..	..	<i>P. Crus-galli.</i>

NORTHERN HALF.

Name.	Europe and N. Africa.	N.-W. HIMALAYA. N. of 32°. S. of 32°.	Central Nepal.	E. HIMALAYA. Sikkim). Bhutan). A (Ka Hills).	D (apple Hills). A (oor Hills, etc.). M (Ishmi Hills).	Burma N(orth).	S.-W. China.	S.-E. China.	Japan.
<i>Distribution value 3138, Mus.</i>									
<i>Jatropha Curcas.</i>	E	N S	N	S B	A	N	..	H	..
<i>Ceratophyllum demersum</i>	E	S	N	S	A	N	..	H	..
<i>Fimbrisylla diphylla</i>	E	N S	..	S	A	N	Y	H	..
<i>Distribution value 3237, tron.</i>									
<i>Pycreustgibbosus</i>	E	N S	N	S	A	N	Y	H	J
<i>Distribution value 3262, tron.</i>									
<i>Plantago major</i>	E	N S	N	S B	D A	N	Y	H	J
<i>Distribution value 3301, tros.</i>									
<i>Porlygonum Hydropper</i>	E	N S	N	S	A	..	Y	H	J
<i>Distribution value 3326, trus.</i>									
<i>Cerdamine hirsuta</i>	E	N S	N	S B	A	N	Y	H	J
<i>Portulaca oleracea</i>	E	N S	N	S	A M	N	..	H	J
<i>Oxalis corniculata</i>	E	N S	N	S	D A	N	Y	H	J
<i>Ageratum conyzoides</i>	E	N S	N	S	A	N	..	H	J
<i>Gnaphalium luteo-album</i>	E	N S	N	S	A	N	Y	H	J
<i>Solanum nigrum</i>	E	N S	..	S	A	N	Y	H	J
<i>Chenopodium album</i>	E	N S	N	S B A	D A M	N	Y	H	J
<i>Setaria glauca</i>	E	N S	N	S B	A M	N	Y	H	J
<i>Imperata arundinacea</i>	E	S	N		A M	N	Y	H	J
<i>Polyogon monspeliense</i>	E	N S	N	S B A	D A	..	Y	H	J
<i>Cynodon dactylon</i>	E	N S	N	S	A	N	Y	H	J
<i>Eleusine indica</i>	E	N S	..	S	A	N	Y	H	J
<i>Phragmites Karka</i>	E	N S	N	S B	A	N	Y	H	J

SOUTHERN HALF.

America.	AFRICA. T(ropical). M(ascarene).	PENINSULAR INDIA. C(eylon). M(alabar). N(orthern). E(astern).	S.-E. ASSAM HILL- TRACTS. G(aro Hills). K(hasia Hills). C(achar Hills). N(aga Hills). M(anipur Hills). L(ushai and Chittagong).	BURMA. N(orth). I(ower). S(han Hills). T(enasserim).	MALAY PENINSULA. N(orth). E(ast). S(outh).	MALAY ISLANDS. J(ava). E(oroco). E(astern Islands).	Australia.	Pacific.	Name.
W	T M	C M N E	....	N L T	N E	J E	..	P	J. Curcas.
W	T	C N E	K M L	N L		E	A	P	C. demersum.
W	T M	C M E	K N M L	N L T	N E	J B E	A	P	F. diphylla.
..	T	C M E	K N	N	N	J B	A	..	P. globosus.
W	T M	C M N	K C N M L	N S	N S	B E	A	..	P. major.
W	T M	M N E	K N	S	N E	J E	A	..	P. Hydropiper.
W	T N	C M	G K N M	N L S	..	J E	A	P	C. hirsuta.
W	T M	C M N E	C N	N L	N E	B E	A	P	P. oleracea.
W	T M	C M N E	K N L	N L S T	N S	J B E	A	P	O. corniculata.
W	T M	C M N E	K N L	N L S	N E S	J B E	A	P	A. conyzoides.
W	T M	M N E	K N L	N S T	..	J B E	A	P	G. luteo-album.
W	T M	C M N E	K	N S	N S	J E	A	P	S. nigrum.
W	T M	C M N E	G K C N M L	N L S T	N E S	J B E	A	P	C. album.
W	T M	C M N E	K N	N S	N E S	E	A	P	S. glauca.
W	T M	C M N E	K	N	N E S	J B E	A	P	I. arundiracca.
W	T M	C M N E	....	N ..	N E S	J E	A	P	P. monspeliense.
W	T M	C M N E	K	N L S T	N E S	J B E	A	P	C. dactylon.
W	T M	C M E	N	N ; T	N S	J B E	A	P	E. indica.
W	T M	C M E	..	N	N E S	J B E	A	P	P. Karka.

PART VI.

Analyses based on the table making Part V, i.e., the distribution of the species of the Flora of Abor-land.

The extension of Abor-land plants in various directions.

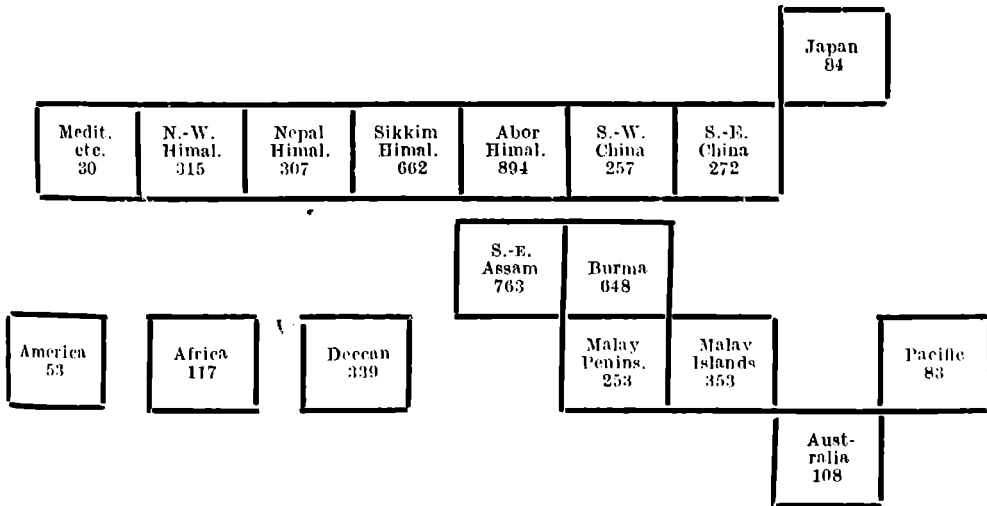
To get together my records of distribution beyond the Abor Hills, I have used, in addition to all available books, the herbaria of the Royal Botanic Gardens, Calcutta, and of the Botanic Gardens, Singapore. There is a vast store* of information in these two, and especially in that of Calcutta, which is now the focus of our knowledge of Indian geographic botany.

I have used these herbaria for my limited purpose, recording many thousand localities in my notes from the labels, as far as they relate to my subject. In doing this I have had much kind help from the staff in Calcutta, especially from Mr. P. M. Debbarman. The greater part of the records so got together are compressed into Table 5 wherein it is shown that out of a total of 894 species, whose occurrence in Abor-land is not due to the direct and recent interference of man, the following numbers are common to :—

Abor-land, and	species.
The Sikkim Himalaya	635
The Khasia and Jaintea Hills	631
Northern Burma	540
The Naga Hills	386
The Shan Hills to Doi Sutep which is in Northern Siam	340
The N.-W. Himalaya south of 32° N.	311
Lower Burma	307
The centre of Nepal	308
Java	298
Tenasserim	283
S.-E. China	272
Manipur	268
Eastern Malaysia	261
S.-W. China	257
The east of the peninsula of the Deccan	253
Malabaria	252
The north of the Malay peninsula	247
The hills of N. Cachar	238

* The store in Calcutta is fifty years' work : it is most of that part of the world's knowledge of Indian botany which has been gathered since Sir Joseph Hooker's Flora of British India began to appear, that is to say since the date when Kew commenced to put Europe's knowledge of the Indian Flora within the easy reach of the worker in India, or since devolution really began : for India in 1871-72, Sir George King having been appointed Superintendent of the Royal Botanic Gardens in Calcutta, commenced to take care of this, its own gathering knowledge, and now possesses a splendid nucleus, which I consider as containing facts enough to justify an use being made of it towards the elucidation of the development of the vegetation of the empire from Miocene times.

	species.
Bhutan	235
The Lushai Hills and Chittagong	231
Ceylon	220
Borneo	190
The Daphla Hills	176
N.-W. Himalaya north of 32° N.	159
The east of the Malay Peninsula	154
The south of the Malay Peninsula	154
The Mishmi Hills	126
The north of the Deccan Peninsula	109
Australia	108
Tropical Africa	103
Japan	84
The Pacific Islands	83
The Mascarene Islands	80
The Garo Hills	61
The American continents	52
Europe and the Mediterranean	30
The Aka Hills	22



Scheme. The numerals are the number of Abor-land species recorded as occurring.

I group these various units of land into the scheme above ; and trace the disappearance of the plants of Abor-land in four directions—east, west, south-east and south-west. Southward land at a distance fails ; northward it is high and dry and quite dissimilar ; moreover, we know so little of this part of the world, that I can only record that as the rain gets less, the Abor clearings become more evident, because they last longer : then beyond the Abors, in the Memba country which Sir George Duff-Sutherland-Dunbar calls “ easy, prosperous and placid ” are permanent terraced rice fields, hamlets with peach trees, orange and “ hill-lime ” trees.

brambles and bracken, grass-lands extending to the steep wall of sterile Tibet (Trans. As. Soc. Bengal V, 1916, extra no. pp. 94-102). But of the plants in the vegetation of this country, we know no more than will enable it to be said, that they seem to be other than those which compose the flora of Abor-land.

The gradual disappearance of the Abor flora westwards, along the Himalaya.

To the way in which the Himalaya is gradually drier westward is to be ascribed the gradual westward decrease of the Abor flora. The result, as far as we can at present recognise it, is that the Sikkim Himalaya lacks 232 of the 895 plants of Abor-land, and the North-west Himalaya 579. Central Nepal lacks 587; but central Nepal is very little known, and as 121 plants common to Abor-land and the North-west Himalaya are as yet unrecorded for central Nepal, assuming their want of record due to want of exploration I set down the absentees of central Nepal, I think not unreasonably, as 121 less than 587, or 466. This figure along with the number of absentees from the Sikkim and the North-west Himalaya is given in the diagram on p. 150 the purpose of which will be evident.

The number of Abor-land plants extending to Europe and the Mediterranean is, as far as ascertained, 30 only, which gives an absentee figure of 864.

I have upon my own impressions rather than upon figures, arbitrarily divided the North-west Himalaya in Table 5 into two parts by the 32° N. 312 Abor-land plants have been found recorded for the hills south of the 32° N. and 159 for the hills north of the 32° N. This is a considerable difference, giving the absentee figure for the remoter hills as 735 or 153 more than the corresponding figure of 582 for the nearer hills.

The figures reflect the fact that the Himalaya gradually changes* its flora from end to end, and in such an even way as to make it possible to section it into as many or as few parts as we may wish.

The increasing dryness of the western end does more than choke plants out; it narrows the belt that they can occupy, and on p. 65 above I have shown that the lower limit of species in Sikkim is already higher than it is in the Abor Hills. This I ascribe to the intrusion, intensest at low elevations, of a dry period into the seasons.

Distribution through China.

The rate at which new species are being described from south-western China is evidence of two facts, one that the Flora is a very rich one, and the other that as yet we know it very imperfectly. Out of the Flora of Abor-land

* In a paper in these Records (IV no. 4, p. 86) I pointed out the blending of eastern and western features in central Nepal, the eastern (by eastern meaning Sikkim features) predominating.

257 species are recorded as occurring in the three Chinese provinces of Szechuan, Yunnan and Kwei-chau, which I count as south-western China; 272 in the provinces of south-eastern China, including Formosa, of which 105 are as yet unrecorded as in south-western China, and 5 more are in Japan. Are we to consider that the 105 are as yet unrecorded in south-western China on account of our want of knowledge or are they to be regarded as reasonable absentees? The answer to this is got by picking out from table 5 the names of the 105, and examining their distribution, whereon the answer to the question is found to be that some must be as yet overlooked, but there are probably absentees. Out of the 105 we find the following missing from Burma:—

Actinostemma tenerum, *Oenanthe benghalensis*, *Jasminum undulatum*, *Hoveia dulcis*, *Scleria elata*, *Ichnanthus pallens* and *Paspalum conjugatum*, their absence from our records supporting their absence from our records of south-western China. Then again the following are as yet not recorded from northern Burma, and may at least be rare there:—*Gynura nervosa*, *Phrynium capitatum*, *Ficus benjamina*, *Ficus gibbosa*, *Fimbristylis junciformis*, *Blumea lacera*, *Hibiscus Abelmoschus*, *Centella asiatica*, *Cyperus diffusus*, *Ficus hispida*, *Eragrostis amabilis*, *Hiptage madablota* and *Rungia parviflora*. But I believe that most of these, last enumerated, will be found to occur in northern Burma, and I suspect that some of them may be found in the direction of Sze-mao, north of which and a little within the borders of China, there is known to be a marked break in the Flora at which Indo-Burman species are supplanted by others of the Yunnan Flora. Apparently the change is connected with the wearing out of the south-west monsoon Bay current, for the plants which drop out are such as require much moisture for a certain season, and like those which drop out in the Himalaya in directions in which the rain decreases; and so when we look at the distribution of these 105 absentees along that range, we find that 57 of them do not pass into drier country beyond Nepal, 21 of them attain the country south of the 32° N. and 27 occur further westward. These 57 confined to the wetter end of the Himalaya may represent an element in the Abor-land flora really excluded from south-western China though admitted through Indo-China into South-eastern China. They are:—*Codonacanthus pauciflorus*, *Actinostemma tenerum*, *Oenanthe benghalensis*, *Jasminum undulatum*, *Aeschynanthus acuminata*, *Thunbergia grandiflora*, *Eranthemum palciiferum*, *Smilax lanceifolia*, *Gynura sarmentosa*, *Ficus fistulosa*, *Arenga pinnata*, *Camellia drupifera*, *Vernonia saligna*, *Cinnamomum obtusifolium*, *Pilea bracteosa*, *Helicia erratica*, *Ficus obscura*, *Celastrus Championii*, *Blumea myrioccephala*, *Ecdysanthera micrantha*, *Ficus pomifera*, *Panicum sarmentosum*, *Musa paradisiaca*, *Litsea lanceifolia*, *Begonia laciniata*, *Blumea balsamifera*, *Torenia edentula*, *Litsea citrata*, *Vitex heterophylla*, *Solanum ferox*, *Buettneria aspera*; *Ficus nervosa*, *Phrynium capitatum*, *Phrynium parvifolium*, *Vandellia pusilla*, *Microglossa volubilis*, *Desmos chinensis*, *Lobelia affinis*, *Homonoia riparia*, *Tropidia angulosa*, *Vitis repens*, *Ficus benjamina*, *Amoora polystachya*.

Embelia ribes, *Costus speciosus*, *Scleria elata*, *Solanum torvum*, *Ilysanthes ciliata*, *Uyathula prostrata*, *Trema orientalis*, *Curculigo recurvata*, *Micromelum pubescens* *Ischaemum rugosum*, *Ichnanthus pallens* and *Paspalum conjugatum*:

On the other hand it is to be assumed that (1) such cosmopolitan weeds as *Solanum indicum*, *Ageratum conyzoides* and *Portulaca oleracea* exist in south-western China, (2) such weeds of wide oriental distribution as *Corchorus acutangulus*, *Amarantus viridis*, *Cassia tora*, *Celosia argentea*, *Vernonia cinerea*, and (3) wide-spread water-plants as *Ceratophyllum demersum* and *Wolffia Michellii* occur in such-western China.

A part, then, of the Abor-land plants known to occur in south-eastern China, but not yet recorded for south-western China, may be assumed as occurring in the latter, and taking this in a rough way as half of the number 105, I deduct 52 from the recorded number of absentees and so get the figure given in the diagram of apparent absentees.

The calculation of absentees from south-western China thus gives us 588, which is not far from the figure 579 ascertained for the north-west Himalaya; the similarity suggesting that the flora eastward at a distance, say, of 500 kilometres is already as diverse from the Abor-land flora as that westward at a distance of about 1,800 kilometres.

Japan (excluding Formosa, etc.) holds, according to the information available to me, only 84 of the species found in Abor-land, giving a total of absentees of 811. Out of these 5 are unrecorded for China, a number so small that I do not propose to correct for it.

Distribution to the south and south-east.

The connection of the Abor-land flora with that of the Khasia Hills appears close; and the flora of the whole of the hills of south-eastern Assam, that is to say, of all that triangular area within which lie the Naga, Cachar, Jaintea, Khasia and Garo Hills, the State of Manipur, the Lushai Hills and Chittagong, is more akin than that of the Sikkim Himalaya, inasmuch as the Sikkim Himalaya has a list of 232 absentees, but the hills of south-eastern Assam one of only 131.

Adjoining this triangle, and at present impossible of clear definition from it, is Burma, itself a complex. Table 5 enumerates 648 of the Abor-land species as known from Burma. We saw above that 540 of them are known from northern Burma, 307 from Lower Burma, 340 from the Shan Plateau (within which Maymyo must of course be included and which for the purpose of this paper I find it convenient to carry southwards beyond Nataung and across the Salween to Doi Sutep in northern Siam), and lastly 283 from Tenasserim.

Appended as it were to Tenasserim comes the Malay Peninsula. Table 5 shows that 253 species of the Abor-land flora reach the Peninsula: 217 of them or nearly all are recorded for the northern part (defined as extending

down as far as Malacca) ; 154 are recorded as occurring in the eastern States of Kelantan, Tringganu and Pahang ; and again 154 as occurring within the State of Johore or the Island of Singapore.

The Malay Islands from Java to New Guinea are recorded in Table 5 as containing 363 of the species of Abor-land, which is more by 100 than are recorded for the Malay Peninsula. Sumatra has been excluded as it is so inadequately known. Of these 353 species, 298 are known to occur in Java, 190 in Borneo, and 261 from Celebes, and Sunda Islands, Moluccas, Philippines and New Guinea.

In Australia 108 of the species of Abor-land are known ; and in the Pacific Islands 83.

There is evidently none of the simplicity of the Himalaya in the dispersal of the Abor-land flora towards the south-east : and what is left to us is indications of one or more very interrupted broken routes.

The Malay Peninsula, in the present period, is upon no through route for plant-migration, but is a wet trough with its own specialised flora ; and Java contains more of the species which occur in Abor-land than it does.

What the real typical relative humidity of the Peninsula is, has not been recorded. The average of Singapore town, in various years, seems to vary from 79 to 83, and is certainly very much lower than the humidity upon which the natural vegetation of the Peninsula lives, just as the air temperature of Singapore town is markedly above that of the country around.

Unrecorded, at present, from Burma, but found in the Malaysian region, are the following 26 plants, which admit of a classification, thus :—

Group A to be expected in Burma :

- (i) Widely distributed proletarian tropical plants—*Paspalum conjugatum*, *Amarantus polygamus*, and *Ichnanthus pallens*.
- (ii) Widely distributed short-lived proletarian subtropical plants—*Veronica javanica* and *Polypogon monspeliense*.
- (iii) A forest plant of Malaysia, reappearing in the Abor Hills—*Timoniscium petiolare*.
- (iv) Forest plants which find the wet climate of the Malay Peninsula and the hills of south-eastern Assam suitable, and may be expected to occur in favoured spots in Burma—*Weberia odorata*, *Smilax megacarpa*, *Medinilla rubicunda*, *Piper pedicellusum*, *Acanthephippium sylhetense* ; the last three of them reach Sikkim.
- (v) Similarly distributed in the north, but reaching further into Malaysia, i.e., to Timor—*Melodinus monogynus*.
- (vi) Forest plants with a broken distribution, occurring in Abor-land and the hills of south-eastern Assam, and reappearing in Java—*Triumfetta cana*, *Rhopalocnemis phalloides*, *Sarcanthus subulatus* and *Ceratostylis teres* ; the second and the last reach Sikkim.

- (vii) A rain-forest tree adding to the area of the last Malabaria, *Dysoxylon binectariferum*.
- (viii) Herbs of broken woodland, with a similar distribution, reaching Malabaria or Ceylon, *Viola distans*, *Scleria elata* and *Carex rara*; the first two reach Nepal, the third is known to occur in Sikkim.

Group B not so likely to be found in Burma:

- (ix) a Pacific type with the western limit in Abor-land and the appearance of having reached eastern Malaysia down the side of the China Sea—*Damnacanthus indicus*.
- (x) Herbs of warm temperate to subtropical regions which appear as if they belong to the Pacific side or Chinese side of Asia, and may have reached north-eastern India and eastern Malaya thence,—*Belamcanda chinensis* and *Polygonum posumbu*.
- (xi) A northern herb which appears to have used similar routes—*Juncus bufonius*.

In consideration of the first group of these I am inclined to allow a small correction to the calculated absentee-figure for Burma and to reduce it by 20 from 246 to 226.

The Malay Peninsula, being on no through route, but as it were the end of a side-track, there is no need to give further thought to the possibility that species we find in Java, but have not as yet found in the Peninsula, should be considered as overlooked; besides the best existing herbarium of the Peninsula has been available for my work. Therefore the 253 species common to Abor-land and the Malay Peninsula may be deducted from the total 894 to give the absentee figure for the Peninsula, which then is 641.

The disappearance of species as this side-track takes origin, is indeed of great interest: travelling down from Tenasserim through the isthmus of Kra, the Siamese Malay States, Kedah, Perak, Selangor and Malacca, we notice first the disappearance of one familiar plant and then of another: but after that if we cross to Java, there appear again some that we had lost, though not all. Nor should we find them again through the whole of Eastern Malaysia. The following are the species which would not be found again:—*Webera odorata*, *Psychotria fulva*, *Quercus lappacea*, *Miliusa roxburghiana*, *Medinilla rubicunda*, *Acanthephippium sylhetense*, *Actephila neilgherrensis*, *Ficus pyri-formis*, *Eleocharis Varunna*, *Microtropis discolor*, *Tylophora exilis*, *Mesua ferrea*, *Ficus obtusifolia*, *Alsomitra clavigera*, *Duabanga sonneratioides*, *Mussaenda macrophylla* and *Dioscorea glabra*. There are 17 names in this list. Out of the 17, towards the north-west 5 find their known limit in Abor-land, 6 in the Sikkim Himalaya, 3 in the Nepal Himalaya, and 3 in the north-western Himalaya: towards the west 2 only get a place in the Deccan flora, namely, *Mesua ferrea* and *Dioscorea glabra*, both being species which occur also in the plains of Bengal: towards the east *Actephila neilgherrensis*,

Ficus obtusifolia, *Duabanga sonneratioides*, *Mussaenda macrophylla* and *Dioscorea glabra* get into south-western China: *Ficus pyriformis* and *Alsomitra clavigera* into south-eastern China.

China, though south-western China gave an absentee figure of 586 and south-eastern China one of 622, against an absentee figure for the Deccan of 555, possesses a much greater share of these species than the Deccan Peninsula.

The following species of Abor-land, finding a limit in the north of the Malay Peninsula, also occur in Java:—*Smilax odoratissima*, *Ophiorrhiza Mungos*, *Engelhardtia spicata*, *Piper attenuatum*, *Cleidion javanicum*, *Calamintha gracilis*, *Blumea densiflora*, *Ecdysanthera micrantha*, *Marsdenia tinctoria*, *Paraphlomis rugosa*, *Laportea crenulata*, *Pratia nummularia*, *Vitex heterophylla*, *Paederia tomentosa*, *Vitis lanceolata*, *Blumea membranacea*, *Trichosanthes cucumerina*, *Pothos scandens*, *Spilanthes acmella*, *Gynostemma pedatum*, *Styrax serrulatum*, *Scleria elata*, *Clematis gauriana*, *Maesa indica*, *Blumea glomerata*, *Buddleia asiatica*, *Polygonum chinense*, *Atylosia scarabæoides*, *Lophotocarpus guianensis*, *Trichosanthes palmata*, *Artemisia vulgaris*, *Zizyphus jujuba*, *Smithia sensitiva*, *Boehmeria platyphylla*, *Cassia tora*, *Deeringia amaranthoides*, *Cudrania javanica*, *Amarantus gangeticus*, *Dichrocephala latifolia*, and *Pycneus globosus*. They are by no means all montane plants of Java but most of them occur at low levels: they are, however, in a large measure plants of drier country than the Malay Peninsula. But what is of more importance still is that so many of them are herbs. Again, only one of them fails to pass along the Himalaya west of the Abor Hills; nine of them reach but the Sikkim Himalaya; four of them reach but Nepal, twenty-five reach the North-western Himalaya and no less than twenty-seven pass into the Deccan.

It has been remarked earlier that the top of Assam and Singapore have the same humidity with a difference in temperature of about 8 degrees Fahrenheit. When, then, we find a series of the plants of Abor-land unable to (obtain or) retain a place in the neighbourhood of Singapore but occurring in Java and elsewhere south and east of Singapore, where the temperature is not lower but more seasonal, then the inference has to be made that it is neither humidity nor average temperature which excludes them from Singapore, but the want of seasonal changes.

Of the species which get into the Deccan, 21 are recorded for the hills of Chota Nagpur, 22 for Ceylon and 24 for Malabar. Ten being recorded for the north part of the Deccan. Of them 12 reappear in Africa and 3 in America. Therefore these species which reach Java without penetrating the wettest part of the Malay Peninsula are rather wide-spread. There are only two trees of any size among them, but 9 climbers and sprawlers. A glance through the list shows them to be very unlike the species which end similarly in the Malay Peninsula without reaching Java: they seem to belong to somewhat different conditions.

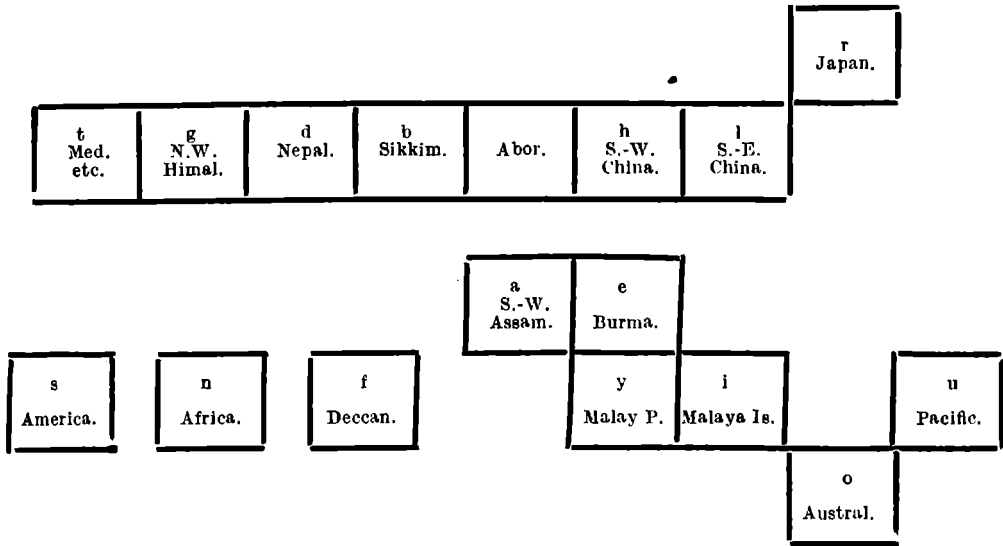
In Eastern Malaysia 38 of the species occur, which fail to penetrate the perennially humid part of the Malay Peninsula, no one of the seven of them which do not occur in Java being a tree, while *Blumea myriocephala*, *Garnotia stricta*, *Anisomeles indica* and *Triraphis madagascariensis* are conspicuously sun-plants. It is as well in regard to them not to forget the possibility of a connection of eastern Malaysia with China by which such plants as these might have passed in one direction or the other, just as the few plants enumerated under numbers ix, x and xi on p. 148 as having, in all probability, found a place in Eastern Malaysia.

Calculation of apparent absentees.

								Japan 810
Medit. etc. 864	N.-W. Himal. 579	Nepal Himal. 466	Sikkim Himal. 232	Abor Himal. 0	S.-W. China 586	S.-E. China 622		
				S.-E. Assam 131	Burma 226			
America 841	Africa 777	Deccan 555			Malay Penins. 641	Malay Islands 541		Pacific 811
							Australia 786	

In Table 5 I have arranged the species enumerated from those of narrow distribution to those of wide distribution, and I have used a system of letters to indicate the wideness of the distribution. The letters are explained by the following diagram, and nothing more need be said about them, except that each of the four series of letters commences towards the beginning of the alphabet. The wideness of the distribution has been calculated by assigning to each area the calculated figure of its absentees; endemic species, thereby, are given the value of 0; a species which reaches Europe is given the value of so great a power of extending 864; Japan value 810; the Pacific Islands value 811; America value 841 and the species attaining all these limits--thirteen--do get a value of 3,326.

Letters given to the different areas, and used in Table 5.



Since Tertiary times began, Australia, probably, never has had more than one route for migration into Malaysia; and that route served for the entry and the exit of such plants as could use it. Therefore a plant common to Abor-land and Australia ought to have existed and possibly ought to exist still in Malaysia; but of absentees from Malaysia, which are present in Australia, there are *Schefflera venulosa*, *Cinnamomum tamala* and *Saussurea affinis*.

Of Abor-land plants 83 occur in the Islands of the Pacific, of which 35 extend to America, and 60 occur upon the African continent or its islands, some extending to both. Putting these aside, the Asiatic element is reduced to *Melastoma normale*, *Allophylus Cobbe*, *Aristolochia indica*, *Garnotia stricta*, *Rhus semialata*, *Micromelum pubescens*, *Ischaemum rugosum*, *Dioscorea pentaphylla*, *Eurya acuminata*, *Glycosmis cochinchinensis*, *Ilysanthes antipoda*, *Bischofia javanica*, *Liparis longipes*, *Aneilema malabaricum*, *Floscopa scandens*, *Themeda gigantea*, *Mollugo stricta*, *Conyza viscidula*, *Artemisia vulgaris* and *Spiranthes australis*.

There is not a tall forest tree among them, but they are species of the open or of scrub, except the epiphyte *Liparis longipes*.

Distribution to the Deccan Peninsula and forward to Africa.

From the Garo Hills to the Rajmehal Hills there is a gap of about 200 kilometres, through which the drainage of two-thirds of the Himalaya, and of the greater part of the Assam Hills, as well as of a great part of the north

of the Deccan at present finds its way to the Indian Ocean. This gap is not really geologically old, for after the latitudinal sea, known as the Tethys, closed up, closing from east to west, the drainage of the north of it ran at first to the west, so long as the great Siwalik River, commencing in the east end of Assam, had a course up the Ganges valley and down that of the Indus; its valley separating the upland plants of the Himalaya from the upland plants of the Deccan, except at its head near Abor-land. At that time some sort of a bridge of uplands may have connected the Garo and Rajmehal hills, and have served as a route, where now there is a breach so waterlogged in the Rainy Season as to interrupt the spreading of a number of perennial plants.

The breach crossed, hills of moderate elevation are continuous thence from Rajmehal to the Western Ghats, upon a line which takes one to the west of India at a latitude north of Bombay: these hills gather, in the Rainy Season, enough rain to constitute a modern route for migration hemmed in by the plains of northern India and the dry basin of the Godavery.

Of the 894 species of Spermatophyta with which we are dealing, 253 are known to occur in the Rajmehal-Sontal-Chota-Nagpur-Orissa area, 109 on the route of which mention has just been made, and 252 in the Western Ghats or Malabaria. The route happens to be less explored than either the Chota-Nagpur region or Malabaria; but it is clear that there is some not inconsiderable failing of the Abor-land species along it, as indicated by the drop in their numbers from 252 (Malabaria) and 253 (E. of the Peninsula of the Deccan) to 109 (N. of the Peninsula of the Deccan). Ceylon comes below Malabaria, with 221 of the species of Abor-land.

The names of the species which occur in the Bengal plains away from the foot of the Hills, and for which obviously the break between the Garo and Rajmehal Hills is no interruption—being in all (excluding three relatively recent arrivals in India) 175 of which 143 occur in the Chota-Nagpur area and 123 in Malabaria—are given in large capitals in Table I (pp. 44-64), and need not be enumerated again. Barely 10 per cent. of the 175 can be called trees.

Plants of Abor-land which reach the Chota-Nagpur region, through the Bengal plains, but do not pass beyond are:—*Curcuma amada*, *Amomum dealbatum*, *Natsiatum herpeticum*, *Amorphophallus bulbifera*, *Randia fasciculata*, *Gouania leptostachya*, *Callicarpa arborea*, *Albizzia procera*, *Plectranthus ternifolius*, *Dioscorea glabra*, *Heteropanax fragrans*, *Blumea laciniata*, *Belamcanda chinensis* and *Dopatrium junceum*,—mostly herbs.

As plants which reach the Chota-Nagpur region, without passing beyond, and leap the Bengal plains are:—*Meliosma pinnata*, *Eugenia Wallichii*, *Acer niveum*, *Calycopteris floribunda*, *Liparis bituberculata*, *Dysoxylon procerum*, *Gardenia campanulata*, *Pterospermum acerifolium*, *Vernonia Roxburghii*, *Holmskioldia sanguinea*, *Dendrobium moschatum*, *Gymnosporia acuminata*, *Rhamnus nepalensis*, *Millettia pachycarpa*, *Musa paradisiaca*, *Eria flava*,

Stemona tuberosa, *Polygonum capitatum*, *Buettnera aspera*, *Crotalaria alata*, *Coffea bengalensis*, *Ajuga macrosperma*, *Ficus Roxburghii*, *Dalbergia pinnata*, *Styrax serrulatum*, *Hedyotis hispida*, *Disporum pullum*, *Abroma fastuosa*, *Pouzolzia hirta*, *Themeda gigantea* and *Carex cruciata*.

As plants of Abor-land which occur in Malabar or in Ceylon or in both, but do not occur in the hills of Chota-Nagpur, though they are found in the Bengal plains are:—*Alpinia Allughas*, *Typhonium trilobatum*, *Mallotus albus*, *Mesua ferrea*, *Geodorum purpureum*, *Solanum ferox*, *Pothos scandens*, *Polygonum runcinatum*, *Scleria elata*, *Ficus heterophylla*, *Ilysanthes ciliata*, *Cyathula prostrata*, *Centotheca lappacea*, *Paspalum conjugatum*, *Sonchus arvensis*, *Cyperus diffusus* and *Hydrocotyle rotundifolia*,—mostly herbs.

As plants of Abor-land and of Malabar or Ceylon or of both, which occur neither in the hills of Chota-Nagpur nor in the Bengal plains are:—*Gomphandra axillaris*, *Olea dioica*, *Myzopyrum smilacifolium*, *Pogostemon intermedia*, *Ficus mysorensis*, *Liparis viridiflora*, *Garcinia Morella*, *Ophiorrhiza Mungos*, *Actephila neilgherrensis*, *Eria muscivora*, *Dysoxylon binectariferum*, *Senecio Walkeri*, *Boehmeria malabarica*, *Stephania glabra*, *Anaphalis aranosa*, *Plectranthus Coetsa*, *Villebrunia integrifolia*, *Chikrassia tabularis*, *Chasalia lurida*, *Fagraea obovata*, *Piper attenuatum*, *Elatostema acuminatum*, *Cleidion javanicum*, *Alpinia malaccensis*, *Rhaphidophora decursiva*, *Panicum uncinatum*, *Ophiorrhiza argentea*, *Ophiopogon intermedius*, *Sauropus macrophyllus*, *Diploclisia glaucescens*, *Elsholzia blanda*, *Sauropus androgynus*, *Pentapanax Leschenaultii*, *Gynura angulosa*, *Urtica parviflora*, *Tropidia angulosa*, *Viola distans*, *Turpinia pomifera*, *Embelia ribes*, *Rubus lasiocarpus*, *Senecio scandens*, *Carex flicina*, *Elatostema lineolatum*, *Carex rara*, *Ichnanthus pallens*, *Fragaria indica*, *Veronica javanica*, *Eurya acuminata*, *Celtis tetrandra*, *Liparis longipes*, *Cynoglossum micranthum*, *Artemisia vulgaris*, *Dichrocephala latifolia*, *Rubus rosæfolius*, *Elatostema sessile* and *Spiranthes australis*.

Out of the above the following reach Africa:—

(a) Such as occur in the Chota-Nagpur hills and in the Bengal plains:—*Deeringia amaranthoides*, *Colocasia esculentum*.

(b) Such as occur in the Chota-Nagpur hills but not in the Bengal plains:—*Paedera foetida*, *Boehmeria macrophylla*.

(c) Such as occur in Malabar or in Ceylon or in both, and also in the Bengal plains:—*Ilysanthes ciliata*, *Cyathula prostrata*, *Centotheca lappacea*, *Paspalum conjugatum*, *Cyperus diffusus* and *Hydrocotyle rotundifolia*.

(d) Such as occur in Malabar or in Ceylon or in both, but not in the Bengal plains:—*Cynoglossum micranthum*, *Artemisia vulgaris*, *Dichrocephala latifolia*, *Rubus rosæfolius*, *Elatostema sessile* and *Spiranthes australis*.

For the moment we will leave these Abor-land with Africa species on one side, and group the Abor-land with Chota-Nagpur plants and the Abor-land

with Malabaria-Ceylon plants together in order to ascertain a little of their History. The following tables refer to them :—

TABLE 6.

The number of species which occur in the Chota-Nagpur area and not westward ; the first figures of each pair refer to plants descending on to the Bengal plains.

Totals.	Reaching N. W. Him. N. of 32°	S. of 32°	Nepal.	Sikkim.	Abor-land.	
1				1+0		Abor Himalaya.
2	0+1	0+1				Reaching S. E. Assam.
16	0+3	1+3	1+1	2+5		Reaching Burma.
18	2+1	3+2	2+3	0+2	0+3	Reaching Malaysia.
9	1+2	1+5				Reaching Australia.
	10	16	7	10	3	Totals.

TABLE 7.

The number of species which occur in Malabaria and Ceylon, but not in the east of the Deccan ; the first figures of each pair refer to plants which occur in the Bengal plains.

Totals.	Reaching N. W. Him. N. of 32°	S. of 32°	Nepal.	Sikkim.	Abor-land.	
4				0+1	0+3	Abor Himalaya.
16	0+4	0+3	0+2	1+6		Reaching S. E. Assam.
38	0+4	2+3	2+5	3+12	2+5	Reaching Burma.
3		0+2			0+1	Reaching Malaysia.
	8	10	9	23	11	Reaching Australasia.
						Totals.

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THE BOTANY OF THE ABOR EXPEDITION

BY

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Director of Gardens, Straits Settlements, formerly in the Botanic Survey of India.



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PART VI—*contd.*

The humidity of Malabar.

When we contrast the relative humidity of the top of the Assam plain with that on the coast of Malabar, or with that in Chota-Nagpur, we find that there are considerable differences.

TABLE 8.

Relative Humidity, the drier months in *clarendon*, the moister in *italics*.

	January	February	March	April	May	June	July	August	September	October	November	December	the Year.
Dibrugarh.	96	92	86	89	89	92	93	93	92	89	89	95	91
Bombay	72	71	74	75	74	82	86	87	87	82	73	73	78
Ratnagiri	63	65	69	70	89	83	87	88	87	78	58	55	73
Marmagao	82	82	79	75	76	86	90	91	91	90	80	76	83
Karwar	81	83	82	78	77	84	86	87	89	89	81	76	83
Mangalore.	66	72	73	69	73	86	88	89	87	83	73	67	77
Calicut	78	79	76	77	79	89	92	91	89	86	82	78	83
Cochin	73	75	77	77	81	87	88	86	85	84	80	74	81
Trivandrum	77	77	76	79	81	87	87	85	83	84	85	79	82
Colombo	80	79	79	83	83	84	83	82	82	84	83	81	82
Ranchi	65	60	45	42	51	72	88	89	84	70	63	64	66
Purulia	73	65	55	54	66	79	88	90	88	78	70	69	73

In the first place the Arabian Sea fails to maintain the air as humid as it is in the top of the Assam plain in every month of the year and in every station except Marmagao in October, where the difference is one point. In the second place, as the table 9 which follows shows, the stations from Bombay to Calicut have less rain from January to May, but make up by an excess in June and July, while the stations of Tivandrum and to Colombo have relatively little rain when Upper Assam is getting its greatest amounts. Further, while Dibrugarh keeps up a monthly average of about 10 inches over six months, four months is the length of the rainy period in the Malabar coast stations.

TABLE 9—Average rain/fall.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Dibrugarh .	1.76	1.94	4.33	11.83	9.22	18.97	20.23	19.65	12.64	4.26	1.31	0.36	106.50
Bombay .	0.09	0.03	0.02	0.06	0.07	18.48	25.17	14.19	10.84	1.84	0.38	0.07	71.88
Ratnagiri .	0.12	0.02	0.05	0.10	1.17	29.10	34.41	20.02	11.97	3.71	0.46	0.09	101.22
Marmagao .	0.03	0.02	0.00	0.87	1.88	29.77	32.10	15.67	8.56	3.91	0.96	0.18	93.85
Karwar .	0.07	0.01	0.00	0.57	3.31	38.24	38.96	20.70	10.77	5.48	1.39	0.15	119.67
Mangalore .	0.08	0.02	0.10	1.48	6.26	36.76	38.64	22.79	10.77	6.91	2.79	0.48	127.08
Calicut .	0.35	0.19	0.63	3.59	9.22	35.25	30.46	15.56	8.09	9.87	4.30	1.06	118.57
Cochin .	0.64	0.75	2.07	5.21	11.39	28.13	22.88	13.09	8.71	13.06	6.29	1.61	118.83
Trivandrum .	0.68	0.61	1.70	4.72	8.67	12.97	7.16	4.09	3.83	19.49	6.23	2.20	63.33
Colombo .	3.52	2.28	4.20	10.27	10.70	7.62	5.05	3.61	4.60	14.94	12.32	5.42	84.53
Ranchi .	0.78	1.55	1.30	1.09	2.29	9.13	15.23	12.83	9.52	2.46	0.22	0.22	56.67
Purulia .	1.05	1.44	0.96	1.38	2.74	7.42	12.28	11.25	10.61	2.62	0.23	0.17	52.15
Hazaribagh .	0.77	1.07	0.01	0.54	2.19	8.29	13.30	9.04	9.04	2.83	0.25	0.22	52.25

The temperature is also higher in Malabar.

TABLE 10—Average maxima and minima temperatures.

Dibrugarh	80.8—64.9
Bombay	86.0—74.9
Ratnagiri	87.3 ¹ —73.1
Marmagao	85.9—74.9
Karwar	86.1—72.7
Mangalore	87.4—73.5
Calicut	86.7—74.3
Cochin	87.8—74.9
Trivandrum	84.1—75.2
Colombo	87.2—75.5
Ranchi	84.4—65.5
Purulia	89.4—68.4

Out of the 46 Abor-land plants which do not pass into the Deccan peninsula further than the Chota-Nagpur area, and out of the 61 plants which, skipping the Chota-Nagpur area, occur in Malabar or in Ceylon or in both, the species extend along the Himalaya as follows:—

N. W. Him. North of 32° N.	N. W. Him. South of 32° N.	Nepal	Sikkim	Abor-land	—
21.74	34.78	15.22	21.74	6.52	end with Chota-Nagpur.
13.11	16.39	14.75	37.70	18.03	extend to Malabar and Ceylon.

Or down the direction of Burma, in the following percentages:—

End with Chota-Nagpur	Extend to Malabar and Ceylon	—
2.17	...	reaching Abor-land
4.34	6.56	„ S. E. Assam
34.78	26.22	„ Burma
39.13	32.30	„ Malaysia
19.57	4.92	„ Australia
99.99	100.00	

It is perfectly evident from these figures that the species which go the furthest along the Himalaya go the shorter way into the Peninsula of India ; and these same species which go the shorter way into the Peninsula of India are diffusely spread along the Burma-Malaysia routes, while the species which have the broken distribution, failing in the hills of Chota-Nagpur to reappear in the West of India, do not pass so freely along the Himalaya, and upon the direction of Australia tend to reach but not to extend beyond Malaysia. Why !—because the latter are more exacting in their humidity requirements.

These observations indicate clearly that the climate of the Indian Monsoon area has become drier ; and as, indeed, we know that upon the east of India, the Caspian region, Turkestan, etc., are drying up, we naturally deduct from that knowledge an assumption that it is the same drying which extends in more or less degree to the Indian Empire. The drying must have taxed the extension of moisture-loving species of the Himalaya eastwards, at the same time encouraging in the North-western Himalaya another set of plants of low stature, and short growing-periods ; and may be assumed to have broken the Abor-Malabar route so that a somewhat diverse flora lives upon it. Burma, also, has developed complications in its Plant-geography, which we are yet far from being able to summarise.

The flora that the drying has let in, is more suited to the average present-day climate of the Monsoon area than that being driven out, so that, for instance,—if the wideness values (Table 5) of all the species which do not pass beyond the hills of Chota-Nagpur be added together and an average calculated ; and if the same be done for the species which occur in Malabar or in Ceylon or in both but not beyond, the species of the former group are found to be by a little the wider in the proportion of 1790 to 1670 : and as all have received the same value in respect of their occurrence in the Deccan peninsula, the higher average is in respect of the wideness of their distribution elsewhere. On the other hand, of the 63 species found in Malabar or in Ceylon or in both, 38 are common to Malabar and Ceylon, 6 are found in Ceylon only and 19 in Malabar only : and it is very much worthy of remark that the species confined to one only of these two are for the most part herbs, which suggests (for further elaboration) that when Malabar and Ceylon were last more nearly connected than they are now, the climate was damper than now and the vegetation forest.

The next land to the west of the coasts of Malabar and Ceylon, except the exiguous Maldives and Laccadives, is in one direction, hot and relatively dry Socotra, and in another, the Seychelles, with a humid climate, and again much further to the south Mauritius and the rest of Mascarenia.

Although there is reason to think that a large stretch of land west of Bombay has gone to the bottom of the sea, such a stretch as might materially have

helped plants to pass in either direction from Mascarenia to the Deccan, the evidence we get from the distribution of Mammals is that Africa and India came to share what they have in common rather by a more northern route, than the direct line, and that those which reached the Mascarene Islands did so *viâ* Africa. There are 117 species of the plants of Abor-land on the west of the Indian Ocean. Their names are easily got from Table 5. Of them 103 are in Africa, and 80 in the Mascarene Islands. The species found in the Mascarene Islands, but not recorded for the continent of Africa, are:—*Paederia foetida*, *Panicum pilipes*, *Leucas lavandulifolia*, *Melastoma malabathricum*, *Boehmeria macrophylla*, *Ilysanthes ciliata*, *Fimbristylis junceiformis*, *Atylosia scarabaeoides*, *Carex filicina*, *Rubus rosae-folius*, *Hypericum japonicum*,—herbs mostly and without exception requiring abundant rain. *Paederia foetida*, *Boehmeria macrophylla*, *Carex filicina*, *Rubus rosae-folius* are not in Malabar, for in India their westward distribution ends in the Chota-Nagpur area, so that their appearance in Mauritius, etc., is unexpected. But equally unexpected for the same reason is the appearance in the continent of Africa of the following:—*Microglossa volubilis*, *Vandellia pusilla*, *Ervatamia divaricata*, *Decringia amaranthoides*, *Colocasia esculentum*, *Juncus bufonius* and *Scirpus setaceus*.

The Abor-land flora has a distinct relationship to that of the hills of South-eastern Assam: it has as much in common with that of the Khasia Hills as with that of Sikkim.

By the totals of the absentees the flora of Abor-land is made to appear more nearly allied to that of the hills of South-eastern Assam, than to that of the Eastern Himalaya; but the time is not yet come for a positive assertion. If for instance we compare the number of the species shared by the three, Sikkim, Abor-land and the Khasia Hills, the result is —

Common to the three, 501 species,

Common to Sikkim and Abor-land, 134 species,

Common to Abor-land and the Khasia Hills, 130 species,

so that the appearance of the hills of South-eastern Assam having a greater intimacy with the flora of Abor-land than the flora of Sikkim has, rests upon our knowledge of the remainder of the two areas; and as everyone knows we are extremely ignorant of the flora of the Aka hills and of Bhutan, which make up with Sikkim the Sikkim Himalaya as here recognised, but we have only a little more knowledge of the Naga Hills, and Manipur, though considerably more knowledge of the (somewhat remote) Chittagong Hill tracts.

The average altitudinal range of different groups of plants.

According to the figures in Table 4, the average range of the species up to 10,000 feet, for—

Aquatics	is through	1,600 feet
Epiphytes	” ”	2,625 ”
Parasites	” ”	3,080 ”
Shrubs	” ”	3,120 ”
Trees	” ”	3,210 ”
Woody climbers	” ”	3,770 ”
Terrestrial herbs	” ”	3,980 ”
Herbaceous climbers	” ”	4,090 ”

The 49 short-lived plants mentioned earlier range through 4,020 ft. between sea level and 10,000 feet, which is about the Himalayan limit of dicotyledonous trees.

Wide-spread plants are commonest in the lowest Zone: restricted species are commonest high up.

Using the values ascertained by the method described on p. 150, it is possible to demonstrate that the lowest zone, Zone 1, contains a greater proportion of the wide-spread plants than the other zones. Wide-spread plants are here taken as those with a higher distribution value than 2,000 (Table 5) and restricted plants those with a lower value than 500:—

In Zone 4,—	21 per cent.	are wide-spread,	against	27 per cent.	restricted
” ”	3,—15	” ”	”	”	30 ” ” ”
” ”	2,—16	” ”	”	”	30 ” ” ”
” ”	1,—31	” ”	”	”	19 ” ” ”

In the Abor mountains, there is only one wide-spread species known above 6,000 feet, but there are 13 restricted species there; upon the other hand in the plains of Sadiya, there are 170 wide-spread species, with 173 restricted species. Between these extremes the proportion of wide-spread species to restricted species changes more or less evenly; whereas it is 1 : 1 at Sadiya, it is 1 : 2 at 2,000-3,000 feet, 1 : 4 at 5,000 feet, and as stated 1 : 13 at above 6,000 feet.

The distribution of restricted Abor-land species.

The Table which follows, Table 11, gives the distribution of the restricted species, altitudinally and in breadth upon the face of the earth. It has one interesting feature, which is that the Sikkim-Abor species (column 4) do not increase numerically downwards in the same proportion as the others. This can have but one interpretation, that the lowest parts of the Sikkim Himalaya are somewhat diverse from the lowest parts of the Abor Himalaya, more

so than say 4,000 feet ; which interpretation runs on all fours with an earlier observation, that hill-plants descend lower in Abor-land than in Sikkim. The origin of the difference may reasonably be explained as lying in the extension of the relative dryness of the Bengal " cold weather " for some little distance up the south hill faces of Sikkim.

TABLE 11—*Restricted species.*

	Endemic	Extend to hills of S.E. Assam	Extend to Burma	Extend to Sikkim	Extend to hills of S.E. Assam & Sikkim	Extend to hills of S. E. Assam, Burma & Sikkim
Over 6,000 feet	2	1	1	1	5	3
5,000—6,000 „	6	3	4	2	4	6
4,000—5,000 „	7	6	12	3	7	11
3,000—4,000 „	10	7	13	8	10	24
2,000—3,000 „	18	14	20	7	14	26
1,000—2,000 „	23	14	22	7	20	40
Under 1,000 „	30	25	32	10	26	50

It is quite clear that the strongholds of the Abor-land endemics are at low elevations ; they are chiefly in the very moist valley-bottoms under the dense canopy of gigantic trees, the places with the most peculiar climatic conditions.

The nature and distribution of the 242 species (see p. 68) which were found only in Zones 2 and 3.

It has been suggested that among these 242 species are those favoured by excessive humidity. Of them, 60 or 25 per cent. are herbaceous and 182 or 75 per cent. woody. Zone 2 gave herbaceous and woody species in the same proportion (see p. 69). The similarity is noteworthy : and again 214 or by far the greater part of the 242 were found in the likewise very wet zone: and it is therefore doubly evident that the flora that stands the greatest humidity is a woody one. If these 214 species, so restricted in Abor-land, be removed from the whole flora of Zone 3, the percentage of herbaceous species in the remainder is 41 and of woody plants 59 : the contrast may be expressed thus :—

Of every 100 species found in Zone 3 which in Abor-land do not spread into the slightly less humid parts, only 25 are herbaceous. Of every 100 species found in Zone 3 which in Abor-land spread into the slightly less humid parts, 41 are herbaceous.

Out of the 242 species found in Zones 2 and 3 only, 49 have been specifically indeterminable, leaving 193 for which the distribution is given in Table 11. Among them are 9 herbaceous and 6 woody species, with a distribution-value below 500. In part the restriction of the species, with a distribution in the world, wide enough to have a value above 2,000, to Zones 2 and 3 is accidental, and further search probably would have revealed some of them elsewhere. They are :—

Herbaceous—*Viola distans*, *Carex flicina*, *Blumea laciniata*, *Goodyera procera*, *Ichnanthus pallens*, *Blumea glomerata*, *Blumea lacera*, *Coix Lachryma-jobi* (elsewhere it occurred, but not wild) and *Peperomia reflexa* ;

Woody—*Pothos scandens*, *Leea indica*, *Amoora Rohituka*, *Ficus gibbosa*, *Celtis triandra* and *Aerua scandens*.

Three of the herbs were found only upon a peculiar steep rocky ridge of the mountain of Bapu, and three of the herbs, together with one of the woody plants, upon the Abor clearing of Rammidambang. Only the epiphytes among the widely distributed plants really belong to the humid air flora ; the rest, and others with a distribution in the world a little narrower, which alike find their place here within the list of the 193 fully determined species observed only in Zones 2 and 3, lower the distinctness of any comparison that can possibly be made between the ranges of the species demanding a very humid climate, and the flora as a whole. However it is very easy to see that restriction to Zones 2 and 3 is accompanied by restriction in the world, for of the 193 species 8 per cent. are wide-spread and 40 per cent. restricted. These percentages should be compared with the percentages given on p. 160 for the flora of Zones 4, 3, 2 and 1 separately.

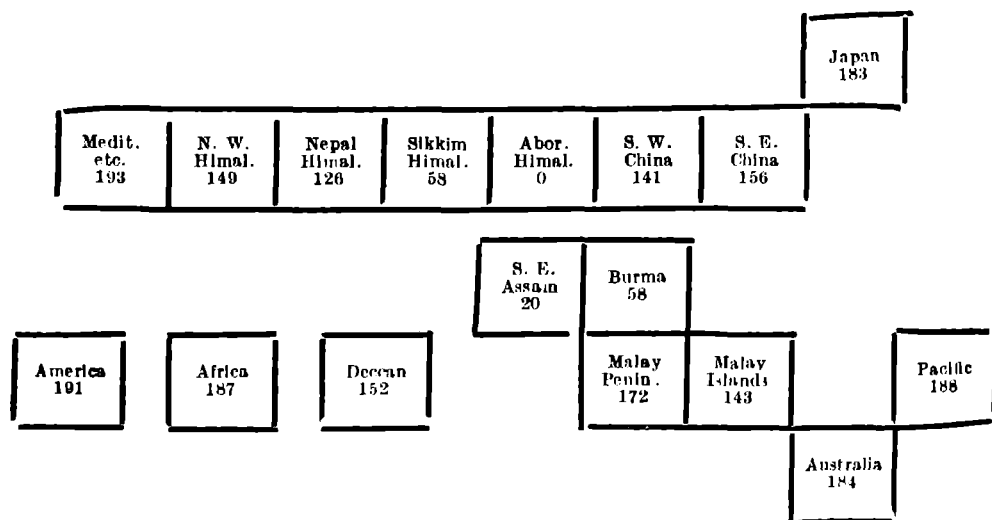


Diagram. Number of absentees from among the species restricted to Zones 2 and 3. Corrections have been made in the figures for Nepal, South-western China and Burma on the same lines exactly as in the previous figures.

It follows that if the percentages of absentees be worked out, zone by zone, the figures obtained for the species restricted to Zones 2 and 3 will be greater than those for the whole flora of Abor-land; and that this is so in general is clearly seen from the following tabular statement, in which the percentage is higher in the second column except in regard to the Hills of South-eastern Assam, for in them 10 per cent. of the restricted plants are absent, whereas of the whole flora 15 per cent. are absent. It is suggested by this one exception that the element in the flora of Abor-land, which is most tolerant of excessive humidity, is rather a part of the flora of South-eastern Assam than of the Himalayan chain.

TABLE 12—*Proportional increase in the number of absentees.*

<i>From the whole flora</i>		<i>From the plants restricted to Zones 2 and 3</i>	
	per cent.		per cent.
Hills of S. E. Assam	15	Hills of S.-E. Assam	10
Burma	25	Burma	30
Sikkim Himalaya	26	Sikkim Himalaya	30
Nepal Himalaya	52	Nepal Himalaya	65
Malay Islands	60	S. W. China	73
Deccan Peninsula	62	<i>Malay Islands</i>	74
N. W. Himalaya	65	N. W. Himalaya	77
S. W. China	65	<i>Deccan Peninsula</i>	79
S.-E. China	69	S.-E. China	81
Malay Peninsula	72	Malay Peninsula	89
Africa	87	Japan	95
Australia	88	Australia	95
Japan	91	<i>Africa</i>	97
Polynesia	91	Polynesia	97
America	94	America	99
Europe and Levant	97	Europe and Levant	100

South-western China and Japan stand higher in the second column; the Malay Islands, Deccan and Africa lower, which if it has a significance means that the climates of Abor-land, South-western China and Japan have diverged in past ages less, and the climates of Abor-land, of the Malay Islands, Deccan and Africa more than the average.

A Summary of Part VI.

The mountains of Abor-land are more evenly humid than any known part of the Himalaya; and may be held as carrying the most extreme hygrophilous flora that the range possesses. The intensest moisture is in the deep valleys and under the very edge of the mountains, and there endemic species have been discovered in greater numbers than elsewhere. Such intense moisture favours trees against herbs, and woody species are present in greater prevalence than either on the plains of Assam or higher up in the mountains; but the endemic species are largely ombrophilous herbs.

Ombrophilous herbs, through the world, are often of restricted distribution; and it is debatable whether this is more because the conditions that

they require are restricted, than because Nature has a busier laboratory for new species in places which "force" vegetation, such as the deep shade of an intensely growing forest, and with the in-breeding of the bottom of the forest, due to the narrow limits through which seeds or pollen would seem there to be transported; and it is the smaller plants with shorter lives, whose round from seed to seed is quicker than that of trees, which have the best chance of profiting by mutation in these places; to that I ascribe the circumstance in Abor-land and elsewhere that the endemic species are mostly herbs or, if woody, small.

The flora of Abor-land is found to be not more like the flora of the Sikkim Himalaya than it is like the flora of the Khasia Hills. Between Sikkim and Abor-land lie scarcely known mountains: between the Khasia Hills and Abor-land are mountains just as little known. The flora of the whole Eastern Himalaya, west of Abor-land, appears slightly more diverse from that of Abor-land than the flora of the whole triangle of mountains from the Naga to the Garo Hills and south through Manipur to the Lushai Hills; but perhaps that is due to want of knowledge. East of Abor-land, it appears that a traveller would soon pass into a diverse flora; and that the limit of the effect of the winds off the Indian Ocean makes a marked and natural floristic boundary. The Malay Islands and the Deccan Peninsula have not a more unlike flora than South-western China. At the same time, the Kashmir Himalaya, 1,800 kilometres away, is again as unlike in its flora to Abor-land as South-western China at, say, 500 kilometres.

The Deccan Peninsula has two floras approaching that of Abor-land; one is along the mountains of the Malabar coast, and the other, in the hilly country which is nearest Abor-land. Abor-land and Malabar must have obtained what they possess in common, when the intervening country had a much damper climate than it has now. The other flora, which is seen in the valleys of Chota-Nagpur, and neighbouring political areas, perhaps came there too late to get across to Malabar, and indeed relatively recently.

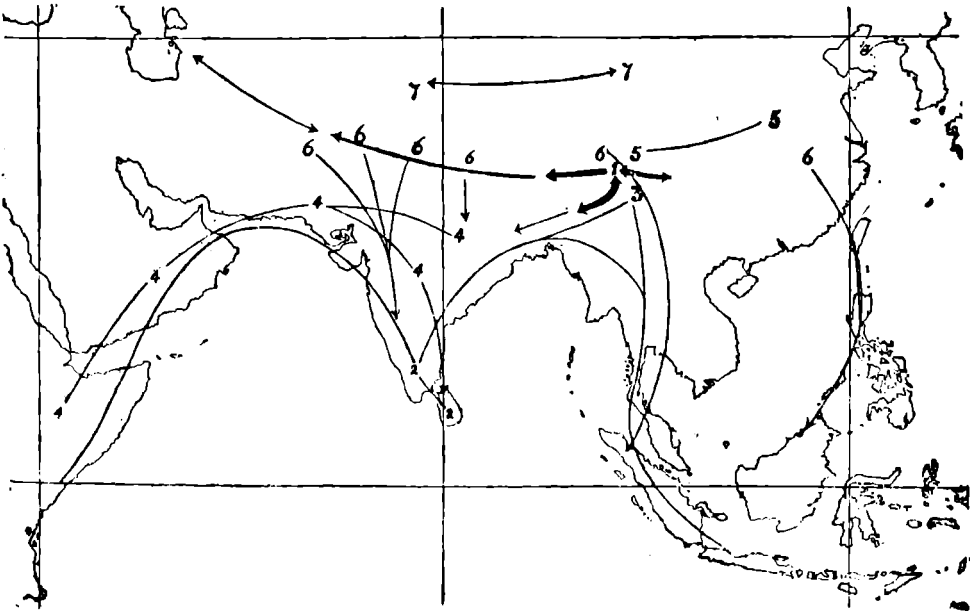
Europe and the Mediterranean, north of the Sahara, has now as little in common with Abor-land as the Americas and Africa, and distinctly less than Japan and the Islands of the Pacific.

It is necessary to demur at calling the Abor-land flora one of Malaysian type, unless (and it would be most unreasonable to do so) the Deccan Peninsula flora be classed as Malaysian also; but both are from a miocene megathermic flora.

PART VII.

The Genesis of the Flora of Abor-land.

In his "Sketch of the Flora of British India" (Imperial Gazetteer, 1, 1907, p. 158) Sir Joseph Hooker wrote, "it may be affirmed that in a large sense there is no Indian Flora proper." But there exists in the Rain-forest of Southern India and Ceylon a flora, which, though it has the appearance of having been borrowed from Malaysia in the beginning, has become quite peculiar enough for recognition as an Indian Flora; and there are about the borders of India other floras also worthy of recognition. With these various floras in relation to the vegetation of Abor-land, the following pages deal; and in the adjoining map, the figure 1 indicates Abor-land; the thickness of the arrows, connecting it with other parts of India, indicates the strength of the community of its flora, as suggested by Part V; the figure 2 indicates the Ceylon-Malabar Rain-forest flora,—the most Indian of all Indian floras; the figure 3 is the rather weaker North-east Indian and Upper Burmese flora, dubbed Assamese in this paper in regard to the part of it that can be recognised within the Abor-land flora; the lines extending up from the south are intended to indicate the probable advent of some of it from Malaysia; the figure 4 is the Afro-arabian element; the figure 5 is the Chinese element; the figure 6 is the northern element, with arrows showing its invasion south of its natural present limits, and lastly, the figure 7 is a flora of the high dry inner Himalaya and high dry inner parts of China.



Confining the evidence, as before, to the Spermatophyta, because Pteridophyta and other lower plants have much greater powers of distribution by reason of the smallness of their spores, by reason of a capability of availing themselves of a surface unsuitable to Spermatophyta, and by reason of their age, the origin of the Flora of Abor-land is approached first by taking the genera recorded, genus by genus, and classifying them into:—

1. Genera which most likely had their origin towards the south-east of Asia, *i.e.* between the position of the Tethys, the Indian Ocean and the Pacific: they are not found in Africa nor in America;

2. Genera common to Asia and America: excluded from Africa;

3. Genera common to Asia and Africa: excluded from America;

4. Genera of a northern type;

5. Genera cosmopolitan in the tropics.

That done, the number of their species has been ascertained as closely as possible in the following areas:—

(a) India south of the Ganges with Ceylon,

(b) The Himalaya,

(c) The country from the Brahmaputra to the Irrawaddy,

(d) China, Indo-China and Siam,

(e) The Malaysian region in a wide sense from the Amherst district of Tenasserim to the east end of New Guinea,

(f) Australia and the Islands of the Pacific.

The following Table is the first result, the genera in it being arranged from those richest in species to those poorest.

TABLE 13—Genera which neither reach America nor pass out of Asia westwards, arranged according to size, the largest genera first.

	South of Ganges	Himalaya	Brahmaputra to Irrawaddy	China, Indo- and Siam	Martaban to New Guinea	Australia and Pacific	Percentage in China, Indo-China and Siam	Percentage in Martaban to New Guinea
<i>Genera of over 100 species.</i>								
Dendrobium . . .	22	37	60	48	824	108	56	83
Eria	17	27	25	15	374	11	3	86
Litsea	21	20	21	25	166	9	11	72
Aglais	7	0	4	15	180	11	7	87
Hoya	5	10	11	5	157	25	2	76
Glochidion . . .	21	12	11	19	109	32	10	59
Coelogyne . . .	7	20	26	17	110	5	11	70

TABLE 13—Genera which neither reach America nor pass out of Asia westwards, arranged according to size, the largest genera first—contd.

	South of Ganges	Himalaya	Brahmaputra to Irrawaddy	China, Indo-China and Siam	Martaban to New Guinea	Australia and Pacific	Percentage in China, Indo-China and Siam	Percentage in Martaban to New Guinea
<i>Genera of over 100 species—contd.</i>								
Ophiorrhiza	11	9	15	18	86	14	12	57
Amomum	13	7	1	18	77	3	12	53
Aeschynanthus	2	9	8	10	106	0	8	86
Dysoxylon	4	2	4	8	76	46	7	66
Sarcochilus	5	3	6	5	63	33	5	69
Globba	3	8	6	27	69	0	26	67
<i>Genera of over 50 species.</i>								
Fagraea	2	1	2	1	89	6	1	92
Zingiber	7	2	6	27	40	1	31	46
Pinanga	1	1	3	4	83	0	5	97
Curcuma	11	5	8	17	33	5	20	38
Artocarpus	4	2	2	3	74	5	4	87
Dipterocarpus	7	1	6	15	60	0	18	73
Rhaphidophora	1	5	8	2	67	6	2	82
Cinnamomum	11	6	7	14	49	4	18	60
Sarcanthus	2	4	4	10	62	0	13	82
Helicia	3	1	4	10	51	10	14	71
Ceratostylis	0	1	2	0	66	1	..	93
Xanthophyllum	1	1	0	2	55	1	3	93
Vatica	5	1	3	6	48	0	10	81
Dillenia	2	3	4	7	46	1	13	81
Trichosanthes	5	8	7	14	28	10	26	52
Chirita	4	11	7	17	21	0	32	40
Alocasia	4	3	7	2	42	3	4	81
<i>Genera of over 20 species.</i>								
Chisocheton	0	0	2	8	44	0	16	88
Neonauclea	2	0	2	6	46	2	12	92
Melodinus	0	1	2	13	20	16	27	41
Agapetes	0	15	13	5	20	1	11	44
Bassia	7	2	1	1	27	10	2	60
Vanda	5	4	5	4	32	1	9	71
Amoora	4	2	3	4	30	6	9	68
Phalaenopsis	0	1	2	4	37	1	9	86
Pterospermum	8	2	3	13	25	1	31	60
Boca	0	0	4	18	20	1	44	49
Machilus	1	9	4	21	8	0	52	20
Aglaonema	0	0	3	6	31	0	15	77

TABLE 13—Genera which neither reach America nor pass out of Asia westwards, arranged according to size, the largest genera first—contd.

	South of Ganges	Himalaya	Brahmaputra to Irrawaddy	China, Indo-China and Siam	Martaban to New Guinea	Australia and Pacific	Percentage in China, Indo-China and Siam	Percentage in Martaban to New Guinea
<i>Genera of over 20 species—contd.</i>								
Ainsliaea	0	2	3	36	3	0	93	8
Michelia	2	5	7	15	14	0	38	37
Conocephalus	0	1	1	1	35	0	3	95
Pholidota	1	7	8	5	21	1	15	62
Luisia	2	6	7	7	18	2	21	55
Gomphandra	2	0	2	2	27	2	6	81
Wendlandia	5	6	4	4	18	3	13	58
Glycosmis	5	3	2	4	25	1	13	83
Gomphostemma	2	4	11	10	14	0	33	47
Codonopsis	0	9	2	21	0	0	72	..
Sabia	1	5	4	12	14	0	41	48
Mazus	2	4	3	23	1	1	82	4
Camellia	0	3	2	23	5	0	82	18
Acanthopanax	0	2	1	24	0	0	96	..
Actinidia	0	2	1	21	1	0	87	4
Sauropus	5	9	3	2	12	0	8	50
Peliosanthes	2	5	4	4	14	0	17	61
Dendrocalamus	2	5	7	2	11	0	9	50
Thladiantha	0	1	2	19	2	0	90	10
Ophiopogon	1	4	6	13	3	1	62	14
Lepisanthes	0	1	3	2	16	0	10	76
<i>Genera of over 10 species.</i>								
Cyclea	1	2	4	7	9	0	..	..
Milusa	4	3	4	7	5	1	..	..
Livistona	0	0	1	2	16	10	..	..
Garnotia	11	2	1	4	2	2	..	..
Ailanthus	2	2	0	7	5	1	..	..
Brassaiopsis	0	9	4	2	7	0	..	..
Pycnarrhena	0	0	1	2	14	2	..	..
Ecdysanthera	0	1	1	10	8	0	..	..
Tropidia	2	2	2	2	14	0	..	..
Tupistra	0	4	4	10	3	0	..	..
Aspidopterys	3	3	3	8	6	0	..	..
Chloranthus	1	1	3	12	6	0	..	..
Kadsura	1	1	1	7	10	0	..	..
Caryota	0	2	2	2	13	1	..	..
Stemona	2	0	4	6	4	1	..	..
Arenga	1	1	1	2	13	0	..	..
Phlogacanthus	0	3	9	4	4	0	..	..
Schima	0	1	2	5	9	0	..	..
Acanthephippium	1	2	1	1	9	0	..	..

TABLE 13—*Genera which neither reach America nor pass out of Asia westwards, arranged according to size, the largest genera first—contd.*

	South of Ganges	Himalaya	Brahmaputra to Irrawaddy	China, Indo-China and Siam	Martaban to New Guinea	Australia and Pacific	Percentage in China, Indo-China and Siam	Percentage in Martaban to New Guinea
<i>Genera of over 10 species—contd.</i>								
Stauntonia	0	1	1	12	0	0	..	..
Geodorum	2	1	3	5	4	3	..	..
Engelhardtia	0	3	3	4	12	0	..	..
Sadiria	0	2	3	0	7	0	..	..
Oaryopteris	0	3	1	11	0	0	..	..
Adenosacme	1	3	1	1	9	0	..	..
Lysionotus	0	1	2	11	1	0	..	..
Miscanthus	0	2	1	8	3	0	..	..
Colocasia	1	3	5	0	7	1	..	..
Pyrenaria	0	1	1	2	8	0	..	..
Micromelum	1	1	1	3	8	1	..	..
<i>Genera of over 5 species.</i>								
Gynostemma	1	1	1	3	8	0	..	..
Murraya	2	2	2	3	10	2	..	..
Trachelospermum	0	2	2	4	3	0	..	..
Villebrunia	1	2	2	4	8	0	..	..
Ostodes	1	1	1	0	9	0	..	..
Cephalotaxus	0	1	2	8	3	0	..	..
Campanumoea	0	4	3	5	0	0	..	..
Myrioneuron	0	1	3	1	5	0	..	..
Rhynchotechum	0	4	4	0	4	0	..	..
Anisomeles	3	1	2	1	2	4	..	..
Baliospermum	1	4	3	1	3	0	..	..
Dinochloa	0	1	1	0	8	0	..	..
Beaumontia	1	1	2	3	2	0	..	..
Stauranthera	0	1	2	1	6	0	..	..
Tinomiscium	0	1	0	2	6	0	..	..
Pericampylus	0	3	3	1	2	1	..	..
Anadendrum	0	1	0	0	7	0	..	..
Pachystoma	1	1	1	1	5	2	..	..
Stuednera	0	3	4	0	1	0	..	..
Sarcosperma	0	1	2	3	2	0	..	..
Boeica	0	2	4	0	2	0	..	..
Naravelia	1	1	1	2	5	0	..	..
<i>Genera of 5 or fewer species.</i>								
Centranthera	2	2	2	3	2	1	..	..
Diochroa	0	1	1	0	5	0	..	..

TABLE 13—Genera which neither reach America nor pass out of Asia westwards, arranged according to size, the largest genera first—contd.

	South of Ganges	Himalaya	Brahmaputra to Irrawaddy	China, Indo-China and Siam	Martaban to New Guinea	Australis and Pacific	Percentage in China, Indo-China and Siam	Percentage in Martaban to New Guinea
<i>Genera of 5 or fewer species—contd.</i>								
Bothriospermum	0	1	1	5	1	0	..	..
Macropanax	0	2	2	2	4	0	..	..
Heterosmilax	0	0	1	2	3	0	..	..
Lepionurus	0	1	1	2	3	0	..	..
Sarcopyramis	0	1	1	3	3	0	..	..
Otochilus	0	4	3	0	0	0	..	..
Hitchenia	1	1	2	0	1	0	..	..
Abroma	0	1	1	1	4	1	..	..
Mesua	2	1	1	1	2	0	..	..
Mosla	0	1	1	4	1	0	..	..
Amblyanthopsis	0	2	1	0	2	0	..	..
Streptolirion	0	1	1	3	0	0	..	..
Spiradiclis	0	2	2	1	1	0	..	..
Carlemannia	0	3	1	0	0	0	..	..
Altingia	0	1	1	2	1	0	..	..
Perilla	0	1	1	3	1	0	..	..
Hodgsonia	0	1	1	0	3	0	..	..
Pogonatherum	1	1	2	2	1	1	..	..
Natsiatum	0	1	1	2	1	0	..	..
Wallichia	0	2	2	1	0	0	..	..
Cardiopteris	0	0	1	2	2	1	..	..
Diploclisia	1	1	2	2	2	0	..	..
Brachytome	0	0	1	0	1	0	..	..
Bischofia	1	1	1	1	1	1	..	..
Damnacanthus	0	1	0	2	0	0	..	..
Tetraphyllum	0	1	1	1	0	0	..	..
Oroxylon	1	1	1	2	1	0	..	..
Anthocephalus	1	1	1	0	2	0	..	..
Rhopalocnemis	0	1	1	0	2	0	..	..
Homonoia	1	1	1	1	2	0	..	..
Mastersia	0	1	0	0	1	0	..	..
Duabanga	0	1	1	0	2	0	..	..
Lasia	1	1	1	1	1	0	..	..
Erythralum	1	1	1	1	1	0	..	..
Kydia	1	2	2	0	1	0	..	..
Curanga	0	1	1	1	1	0	..	..
Polyura	0	1	1	0	0	0	..	..
Codonacanthus	0	0	1	1	0	0	..	..
Heteropanax	0	1	1	1	1	0	..	..
Coix	1	1	1	1	1	1	..	..
Hovenia	0	1	0	2	0	0	..	..
Aspidocarya	0	1	1	1	0	0	..	..
Brachystemma	0	1	1	0	0	0	..	..

TABLE 13.—Genera which neither reach America nor pass out of Asia westwards arranged according to size, the largest genera first—concl'd.

	South of Ganges	Himalaya	Brahma-putra to Irrawaddy	China, Indo China and Siam	Martaban to New Guinea	Australia and Pacific	Percentage in China, Indo-China and Siam	Percentage in Martaban to New Guinea
<i>Genera of 5 or fewer species—concl'd.</i>								
Gynocardia	0	1	1	0	1	0	:::	:::
Drimycarpus	0	1	1	1	1	0	:::	:::
Smithiella	0	1	0	0	0	0	:::	:::
Sapria	0	1	1	1	0	0	:::	:::
Thysanolaena	1	1	1	1	1	0	:::	:::
Sylvianthus	0	1	1	0	0	0	:::	:::
Sarcochlamys	0	1	1	0	1	0	:::	:::
Chuckrassia	0	1	1	1	0	0	:::	:::
TOTAL	340	496	580	991	4289	432	..	..

Genera represented in Abor-land, which do not occur in America nor in Africa; are often characteristically Malaysian.

The genera of the above Table, it may be said straightaway, are very largely developed in Malaysia*, so that the total number of species that they present, as exhibited, is

- 4289 in Malaysia, including therewith Tenasserim, the Malay Peninsula and all the Malayan Islands to the Philippines and New Guinea,
- 991 in China, Indo-China and Siam,
- 580 in the country between the Irrawaddy and the Brahmaputra,
- 496 in the Himalaya,
- 432 in Australia and the Pacific Islands, and
- 340 in the Peninsula of the Deccan and in Ceylon.

4289 is approximately 70 per cent. of the total number of the species within the genera. Next confining attention to genera with more than 20 species, I propose to classify these in a rough way by the percentages of their species in the different areas, and (taking 67 per cent. or two thirds, instead of 70), to enumerate the genera which have at least two thirds of their species in Malaysia.

*The areas, of course, are unequal in surface; but for the purpose of this report, it is not easy to equalise them, and the nearer they are to Abor-land the smaller must they be made.

These genera are 67 and more per cent. Malaysian.

The following have 67 per cent. and more of their species in Malaysia :—

Dendrobium	Helicia
Eria	Ceratostylis
Litsea	Xanthophyllum
Aglaia	Vatica
Hoya	Dillenia
Coelogyne	Alocasia
Aeschynanthus	Chisocheiton
Sarcochilus	Neonauclea
Globba	Vanda
Fagraea	Amoora
Pinanga	Phalaenopsis
Artocarpus	Aglaonema
Dipterocarpus	Conocephalus
Rhaphidophora	Gomphandra
Sarcanthus	Glycosmis
	Lepisanthes

Such Malaysian genera have had their genesis under a long period of humid conditions.

The epiphytism in the list is remarkable; for it contains *Dendrobium*, *Eria*, *Hoya*, *Coelogyne*, *Aeschynanthus*, *Sarcochilus*, *Fagraea* (sometimes epiphytic), *Rhaphidophora*, *Sarcanthus*, *Ceratostylis*, *Vanda* and *Phalaenopsis*, truly a remarkable series, emphasising the fact that eastern epiphytism is pre-eminently Malaysian, or, to put it another way, that the area now represented by the Malaysian Islands, etc., has contained, over a long period, areas of humid airs and great forests, so that this enormous development of epiphytism has taken place.

In this same list occur the names of genera of plants characteristic of the bottoms of high forests, e.g. *Globba*, *Pinanga*, *Alocasia*, and *Aglaonema*,—Monocotyledones, —whose genesis may well have occurred under conditions the same as those of the epiphytes. The others are genera of woody plants which compose the shade trees of the forests, and whose seedlings survive in shade.

There are, however, in the Table certain Genera less than 33 per cent. Malaysian.

The following are genera which have less than one third or 33·3 per cent. of their species in Malaysia, arranged by their size :—

	per cent.		per cent.
<i>Machilus</i>	20	<i>Camellia</i>	18
<i>Ainstraea</i>	8	<i>Aeranthopanax</i>	0
<i>Codonopsis</i>	0	<i>Actinidia</i>	4
<i>Mazus</i>	4	<i>Thladiantha</i>	10
		<i>Ophiopogon</i>	14

They are none of them such very large genera as the earlier list contains. *Acanthopanax* is 90 per cent Chinese; *Ainsliaea* is 94 per cent.; *Thadialtha* is 90 per cent. (in this case Indo-China contributes largely); *Actinidia* is 87 per cent.; *Camellia* and *Mazus* are 82 per cent. (but possibly many Chinese species of *Mazus* are not good); *Codonopsis* is 72 per cent. and *Ophiopogon* is 62 per cent.:—all of which genera may be considered as Chinese in chief part. *Machilus* remains, which like so many Lauraceae is rather diffuse in its distribution; but, nevertheless, it has 52 per cent. or more than half of its species in the China-with-Indo-China area.

There is no genus of epiphytes among them, and only one of trees (*Machilus*), the rest being shrubs and herbs. How unlike is this small assemblage to the larger one that has been called Malaysian; and what an unlike climate must have been that in which they had their genesis! Their geographic distribution in the present day, suggests their origin to the north of the last group, most likely in some part of the present country of China, where, as geology tells us, there is a long history of dry climates in the past, drier, too, in places than these genera require. The figure 5 on the map represents them.

The following Genera are intermediate.

The next list is of the genera neither distinctly Malaysian nor distinctly Chinese.

It is an easy thing, in the Table on p. 166, to add the percentages for China and Malaysia together. Upon doing so, *Agapetes* is found to have 45 per cent. of its species outside the two; *Sauropus* and *Curcuma* 42: *Dendrocalamus* 41: *Bassia* 38: *Amomum* 35: *Melodinus* 32: *Ophiorrhiza* and *Glochidion* 31: *Wendlandia* 29: *Chirita* 28: *Dysoxylon* 27: *Michelia* 25: *Zingiber*, *Luisia* and *Pholidota* 24: *Trichosanthes*, *Peliosanthes* and *Cinnamomum* 22: *Gomphostemma* 20: *Sabia* 11: *Pterospermum* 9: and *Boea* 7.

Agapetes, *Luisia* and *Pholidota* are the three genera of epiphytes in the list; and *Agapetes* stands first, with 45 per cent. of its species outside Malaysia and outside China with Indo-China and with Siam. Where do these species occur?—in the region which embraces the mountains of south-eastern Assam, northern Burma and the east end of the Himalaya, in fact in the area which embraces Abor-land. The other two genera of epiphytes, *Luisia* and *Pholidota* are like *Agapetes* in being well represented in the same area. *Sauropus* which is a genus of the bottom of high forest, is like them too; *Trichosanthes*, and *Chirita*, *Michelia*, *Wendlandia* and *Peliosanthes* also.

Intermediate Genera, the type indicates whether higher (clarendon) or lower (italics) in the second column.

A.—Arranged according to percentages for China.

B.—Arranged according to percentages for Malaysia.

Bassia (2)	1	Michelia (37)
Dysoxylon (7)	2	Curcuma (38)
Sauropus (8)	3	Chirita (40)
Dendrocalamus (9)	4	Melodinus (41)
Glochidion (10)	5	Agapetes (44)
Agapetes (11)	6	Zingiber (46)
Amomum (12)	7	Gomphostemma
Ophiorrhiza (12)	8	Sabia (48)
Wendlandia (13)	9	Boea (49)
Pholidota (15)	10	<i>Dendrocalamus</i> (50)
Peliosanthes (17)	11	<i>Sauropus</i> (50)
Cinnamomum (18)	12	Trichosanthes (52)
Curcuma (20)	13	<i>Amomum</i> (53)
Luisia (21)	14	Luisia (55)
Trichosanthes (26)	15	<i>Ophiorrhiza</i> (57)
Melodinus (27)	16	<i>Wendlandia</i> (58)
Pterospermum (31)	17	<i>Glochidion</i> (59)
Zingiber (31)	18	<i>Cinnamomum</i> (60)
Chirita (32)	19	<i>Bassia</i> (60)
Gomphostemma (33)	20	Pterospermum (60)
Michelia (38)	21	<i>Peliosanthes</i> (61)
Sabia (21)	22	<i>Pholidota</i> (61)
Boea (21)	23	<i>Dysoxylon</i> (66)

These intermediate genera seem to have among them some for which a genesis in a rain-forest area not remote from Abor-land might be asserted.

Omitting *Wendlandia*, the genera just mentioned are genera of humid airs, and we must look for an area of humid forests for the place of their genesis, an area presumably north of the Malaysian region, in fact in the direction of the Assam-North Burma rain-forests.

But the success of such a Rain-forest area in evolving genera has been conspicuously less than in the Malaysian area, and in like measure the Ceylon-Malabar area.

It is an observation of considerable importance that the endemic genera of the Assam-North Burma Rain-forest area are for the most part monotypic or nearly so, and invariably rather small. None of them approach in size the large genera of the list just given (p.172), nor also many other genera, which do not escape from the limits of Malaysia. In numbers these genera closely correspond to the endemic genera of the Ceylon-Malabar Rain-forest area, and if in two floras of sufficiently similar regions, the number and size of the endemic genera correspond, there is a possibility of a similar history

and above all of the isolation of these floras having been of similar duration or degree. The circumstance, then, of the Assam-North Burma Rain-forest holding small endemic genera, in a measure corresponding to the Ceylon-Malabar area, can be used as an argument to support other arguments for their isolation having been similar. The figure 3 on the map stands for this flora.

The Genera endemic within the Assam-North Burma Rain-forest Area.

Brachystemma (Caryophyllaceae)	Dittoceras (Asclepiadaceae)
Sladenia (Ternstroemiaceae)	Bythophyton (Scrophulariaceae)
Hartia (Ternstroemiaceae)	Peranthia (Gesneraceae)
Paradombeya (Sterculiaceae)	Tremacron (Gesneraceae)
Anisadenia (Linaceae)	Ancylostema (Gesneraceae)
Bretschneidera (Sapindaceae)	Briggsia (Gesneraceae)
Dobinea (Sapindaceae)	Hemiphragma (Scrophulariaceae)
Pegia (Anacardiaceae)	Loxostigma (Gesneraceae)
Priotropis (Leguminosae)	Platystemma (Gesneraceae)
Cochlianthus (Leguminosae)	Boeica (Gesneraceae)
Maddenia (Rosaceae)	Tetraphyllum (Gesneraceae)
Sycopsis (Hamamelidaceae)	Leptoboea (Gesneraceae)
Warea (Cucurbitaceae)	Craniotome (Labiatae)
Herpetospermum (Cucurbitaceae)	Roylea (Labiatae)
Pentapanax (Araliaceae)	Notochaete (Labiatae)
Gamblea (Araliaceae)	Hydrobryum (Podostemaceae)
Tupidanthus (Araliaceae)	Dodecadenia (Lauraceae)
Luculia (Rubiaceae)	Syndiclis (Lauraceae)
Clarkella (Rubiaceae)	Lasiococca (Euphorbiaceae)
Carlemannia (Rubiaceae)	Cryptochilus (Orchidaceae)
Silvanthus (Rubiaceae)	Trichosma (Orchidaceae)
Polysolenia (Rubiaceae)	Acrochaene (Orchidaceae)
Keenania (Rubiaceae)	Hancockia (Orchidaceae)
Catamixis (Compositae)	Herpysma (Orchidaceae)
Peracarpa (Campanulaceae)	Stichoneuron (Roxburghiaceae)
Pentapterygium (Vacciniaceae)	Theropogon (Liliaceae)
Cheilothea (Monotropaceae)	Gonioscypha (Liliaceae)
Hymenandra (Myrsinaceae)	Thomsonia (Araceae)
Pentabothra (Asclepiadaceae)	Gonatanthus (Araceae)

The Himalaya contributes little to this list : it is poor in Rain-forest endemism as estimated by genera.

Out of these genera very few occur in the wet Himalaya only. They are *Cochlianthus*, *Warea*, *Gamblea*, *Carlemannia*, *Pentasacme*, *Dittoceras*, *Platystemma*, *Notochaete*, *Syndiclis*, *Lasiococca*, *Acrochaene*, and *Gonioscypha*. Such as they are, they belong to the flora indicated by 3 in the map.

The Himalaya carries other genera of quite another genesis.

The other endemic genera of the Himalaya do not belong to the Rain-forest, but like *Triachne*, *Atelanthera*, *Loxastemon*, *Christolea*, *Thylacospermum*, *Stracheya*, *Triachne*, *Cortia*, *Pentaptyxis*, *Leptocodon*, *Cyananthus*,

Diplarche, *Bryocarpum*, *Treutlera*, *Jaeschkea*, *Parajaeschkea*, *Lindelofia*, *Picrorrhiza*, *Oreosolen*, *Eriophyton*, *Microgynoecium*, *Microschoenus*, *Ischnochloa*, and *Duthiaea* belong to the Tibetan flora, which our growing knowledge shows us to reappear in Kansu, or like *Catamixis*, *Molikia* and *Lindelofia* (?), to belong to the North-west Himalaya. This flora is indicated by 7 on the map.

The Rain forest-endemic genera of Ceylon and Malabaria, Flora 2 on the map.

Schumacheria (Dilleniaceae)	Brachylepis (Asclepiadaceae)
Trichadenia (Bixaceae)	Uleria (Asclepiadaceae)
Doona (Dipterocarpaceae)	Championia (Gesneraceae)
Monoporandra (Dipterocarpaceae)	Jerdonia (Gesneraceae)
Stemonoporus (Dipterocarpaceae)	Calacanthus (Acanthaceae)
Beddomea (Meliaceae)	Diotacanthus (Acanthaceae)
Solenocarpus (Anacardiaceae)	Ptyssiglottis (Acanthaceae)
Pericopsis (Leguminosae)	Banalia (Amarantaceae)
Wagatea (Leguminosae)	Lawia (Podostemaceae)
Blepharistemma (Rhizophoraceae)	Griffithella (Podostemaceae)
Kendrickia (Melastomaceae)	Farmeria (Podostemaceae)
Dicoelospermum (Cucurbitaceae)	Hortonia (Monimiaceae)
Fergusonia (Rubiaceae)	Podadenia (Euphorbiaceae)
Leucocodon (Rubiaceae)	Josephia (Orchidaceae)
Schizostigma (Rubiaceae)	Cottonia (Orchidaceae)
Byrsophyllum (Rubiaceae)	Diplocentrum (Orchidaceae)
Nargodia (Rubiaceae)	Cyphostigma (Scitamineae)
Scyphostachys (Rubiaceae)	Elettaria (Scitamineae)
Octotropis (Rubiaceae)	Loxococcus (Palmae)
Lamprachenium (Compositae)	Lagenandra (Araceae)
Adenoon (Compositae)	Anaphyllum (Araceae)

The Himalaya is found to be poor in Rain-forest endemism when species are taken into consideration apart from genera.

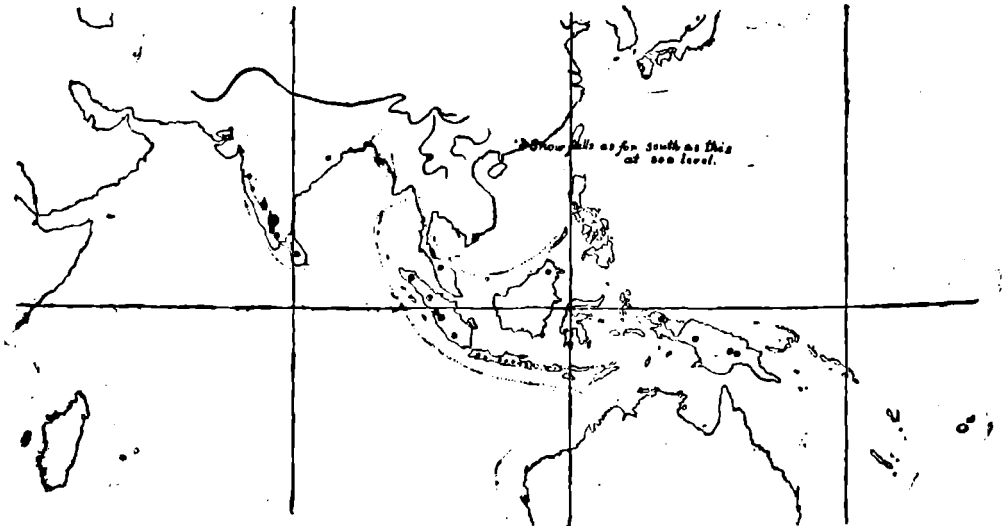
The want of originality about the Himalayan Rain-forest vegetation may be illustrated in another way (Table 14). Taking the genera of the Aborland flora, which we have shown to be pre-eminently Malaysian and therefore Rain-forest genera, the Table shows in what measure they are present in the North-west Himalaya, the whole Himalaya, China and the Ceylon-Malabaria area, in what measure each area is supplied with species from North-eastern India, and in what measure from beyond. The Ceylon-Malabaria area is found to possess a very great individuality, 80 per cent being endemic; China, largely on account of its tropical flora in Hainan and Formosa, to possess an endemic list 64 per cent strong; the whole Himalaya to have an endemic list amounting to 23 per cent. while its north-west end, that is to say west of the Kingdom of Nepal, possesses an endemic list only amounting to 10 per cent. China gets 5 species that are in the hills of north-eastern India, and so does the Ceylon-Malabaria area; but the North-western Himalaya gets 15 in a total of only 31 species.

TABLE 14.

Genus.	Nature.	Reach N. W. Himalaya from N. E. India.	Reach N. W. Himalaya from beyond N. E. India.	Endemic in N. W. Hfm.	Reach S. India from N. E. India.	Reach S. India from beyond N. E. India.	Endemic in S. India.	Reach N. or S. E. China from N. E. India.	Reach N. or S. E. China from elsewhere.	Endemic in China.	Total Himalaya.	Endemic therein.
Dendrobium	epiphytes	3	3	1	2	1	15	3	1	5	37	8
Eria	epiphytes	1	1	..	1	..	16	..	1	8	27	6
Litsea	trees	3	2	..	..	3	18	..	6	16	20	3
Aglaia	trees	..	..	..	..	2	1	..	1	..	..	..
Hoya	epiphytes	2	..	..	..	..	5	..	1	1	10	6
Coelogyne	epiphytes	3	2	..	..	..	5	1	..	2	20	4
Aeschynanthus	epiphytes	..	..	1	..	..	2	1	..	1	9	4
Sarcophilus	epiphytes	..	..	..	..	..	5	..	..	2	3	1
Globba	shade herbs	..	..	1	1	1	1	..	..	..	8	2
Fagraea	trees, shrubs & some epiphytes	..	..	..	..	1	1	..	..	..	1	..
Plmanga	shade palms	..	..	..	..	..	1	..	..	..	1	..
Artocarpus	trees	..	1	..	..	..	3	..	1	1	1	..
Dipterocarpus	tall trees	..	..	..	..	..	5	..	..	..	1	..
Rhapidophora	epiphytes	1	..	..	..	1	..	..	1	..	6	..
Sarcanthus	epiphytes	..	..	..	..	1	1	..	..	8	4	2
Helicia	tall trees	..	..	..	..	..	3	..	2	1	1	..
Ceratostylis	epiphytes	..	..	..	..	..	..	..	..	..	1	..
Xanthophyllum	trees	..	..	..	..	..	..	..	..	..	1	1
Vatica	trees	..	..	..	..	..	4	..	..	..	1	..
Dillenia	trees	..	..	..	..	2	2	..	..	..	3	..
Alocasia	shade herbs	..	1	..	..	3	..	..	2	1	3	..
Chisocheton	trees & shrubs	..	..	..	..	..	..	..	..	..	1	..
Neonauclea	trees & shrubs	..	..	..	..	..	3	..	..	..	1	..
Vanda	epiphytes	2	1	..	..	1	2	..	..	2	4	2
Amoora	trees	..	..	..	..	1	3	..	1	..	2	..
Phalaenopsis	epiphytes	..	..	..	..	..	..	..	1	..	1	..
Aglaonema	shade herbs	..	..	..	..	..	..	..	..	..	1	..
Conocephalus	climbers	..	..	..	..	..	..	..	..	..	1	..
Gomphandra	trees	..	..	..	1	..	1	..	..	..	1	..
Glycosmia	shrubs	..	1	..	..	1	1	..	1	..	3	1
Leptanthus	trees & shrubs	..	..	..	..	..	..	..	..	..	1	..
Caryota	forest palms	..	..	..	..	1	..	..	1	1	2	1
Arenga	forest palms	..	..	..	..	..	1	..	1	1	1	..

TABLE 14—contd.

Genus.	Nature.	Reach N.W. Himalaya from N. E. India.	Reach N.W. Himalaya from beyond N. E. India.	Endemic in N. W. Him.	Reach S. India from N. E. India.	Reach S. India from beyond N.E. India.	Endemic in S. India.	Reach N. or S.E. China from N.E. India.	Reach N. or S.E. China from elsewhere.	Endemic in China.	Total Himalaya.	Endemic therein.
<i>Schinus</i>	forest trees	..	..	..	..	..	..	..	1	1	1	..
<i>Sadiria</i>	shrubs	..	..	..	..	..	..	..	..	..	2	2
<i>Pyrenaria</i>	small trees	..	..	..	..	..	..	..	..	..	1	..
<i>Myrianeuron</i>	small shrubs	..	..	..	..	..	..	..	..	..	1	..
<i>Dinochloa</i>	big bamboos	..	..	..	..	..	..	..	..	..	1	..
<i>Stauroanthera</i>	shade herbs	..	..	..	..	..	..	..	..	..	1	..
<i>Tinomisium</i>	climbers	..	..	..	..	..	..	..	..	..	1	..
<i>Anadendrum</i>	epiphytes	..	..	..	..	..	..	..	..	..	1	..
<i>Dichroa</i>	shrubs	..	..	..	..	..	..	..	1	..	1	..
<i>Macropanax</i>	small trees	..	..	..	..	..	..	..	..	..	2	..
<i>Abroma</i>	trees & shrubs	..	1	..	..	..	..	..	1	..	1	..
<i>Hodgsonia</i>	climbers	..	..	..	..	..	..	..	..	..	1	..
TOTAL	..	15	13	3	5	19	90	5	24	51	101	43
		31			123			80			den lem per cent.	
		Endemism 10 per cent.			Endemism 80 per cent.			Endemism 64 per cent.				



Map showing position of Colonies of northern plants within the Eastern tropics

The Rain-forests of the Himalaya are not old, and therefore their small endemism.

The theory, to hand, in explanation of this poverty of Rain-forest endemism is, that the beautiful Himalaya, new among the mountains of the earth, rising still, has not had the opportunity necessary for developing a Rain-forest vegetation of its own since the climates of the world settled into their present relative steadiness : and this would be in considerable measure, because the Glacial Period must have disturbed any pre-existing tropical or subtropical rain-forest* which it carried, driving it out, and where there were not the hill-chains of Pacific type, as at the east end, for an escape, annihilating most of what there was against the Deccan plains.

The Pre-glacial condition of India.

Dr. H. G. E. Pilgrim, who has paid great attention to the Siwalik formations of India, in 1913 (*Records of the Geological Survey of India*, 45, p. 325) placed the whole of those strata in the Pliocene, but later (*Journal of the Asiatic Society of Bengal*, N. S. xv., 1919, p. 81) suggested, on account of the presence in them of bones, etc., of a *Camelus*, that possibly the uppermost are Pleistocene. This brings their depositing right up against the Glacial Period ; but he adds that it is improbable that any of the strata are contemporaneous. He and also Dr. E. H. Pascoe (in the *Quarterly Journal of the Geological Society*, LXXXV, 1920, p. 128) show reason for believing that a great Siwalik river ran from upper Assam westwards to the Arabian Sea, through great plains, which plains, subsequently bereft of a bit of their northern edge by elevation and absorption into the rising Himalaya, exist to this day, separating the Himalaya from the uplands of the Deccan ; and their existence has been continuous. We do not know what plants grew upon them when the Siwalik deposits were laid down, but because we know a fair number of the animals we know to some degree that their climate was relatively dry about the end, at any rate, of the Pliocene period. The mammals of the deposits are listed by Dr. Pilgrim upon p. 324 of the *Records of the Geological Survey of India*, vol. XLIII, 1910.

The Ethiopian nature of the fauna, the giraffes, the gazelles and other ungulates, which are constructed for prairie life or at least savannah life, and again the appearance (late in the Siwalik series) of the camel indicate a dry climate, possibly quite comparable to that of the Panjab now, where the camel lives healthily, and the lion, a companion of the giraffes and the gazelles, still

*There are plenty of evidences of an ancient extension of the western Himalayan flora further west, as for instance in the Cedars ; and I would like to cite another, that is the existence of species of very close affinity to *Dioscorea deltoidea*, Wall., in the Caucasus and the Balkans, so close that one common parent must have broken-up into the three.

just persists. The depth of the gravels indicates a large river system, probably seasonal in its size. The land conformation indicates a probability that the winds had the same directions and seasonal variations as now : and in fact the climate of India, at the end of the Pliocene, is not demonstrated yet as unlike what it is to-day, except for the enormous interference of man. I believe that it was as now, that is dry under the lee of Africa, but wet further eastwards wherever coast-lines or mountain-lines offered an unprotected face to the south-west.

Breaking in on these conditions came the Glacial Period with its recurring spells of unusual cold.

Heer† working in Switzerland calculated the mean annual temperature in that country, in the Upper Pliocene, as 9°C. (64°F.) which is the mean of the present time, and allowed the maximum lowering of the second Glacial Period to have been to 4°C. (46°F). Clement Reid‡ assigned to the time of the laying down of the Cromer forest-bed, which is in the latest Pliocene, a climate with temperatures as now : but a gradual lowering of the averages had occurred up to that time. These matured opinions, of course, do not prove that the climate of India was also as now ; and I am painfully aware of my inability to produce further proof, both from lack of knowledge and from lack of literature : but I believe that the climate was probably in its larger features much as it is now.

The Glacial Period supervened. Croll's theory of the cause of the Glacial Period requires that the cold should alternate from north to south, and a consequence of increased cold in such a way would be a driving backwards and forwards across the equator of the vegetation demanding most warmth ; but luckily, Croll's theory has given way to another according to which, while great cold is evoked, the actual intensity of the effect came from overwhelming precipitations leading regionally to accumulations of snow and ice, such as the warmth of summer could not remove. This theory leaves it possible for us to retain a necessary belief in the persistence of the intertropical rain-floras, more or less, where they are now : and this is satisfactory for it is not possible to believe that the Pleistocene Glacial Period acted destructively upon the Malaysian flora, though it may be asserted to have compressed it from the north, when it let-in the chief part if not all of the northern spermatophytes found upon the tropical mountains of both worlds. With that letting-in it is well to deal next ; but first there are two remarks to make, which are—(1) that the hottest parts of this earth are deserts just about the boundaries of the Tropics and not at the Equator itself and (2) that the Glacial Period may have sorely pressed upon the vegetation of similarly placed hot parts without compressing much the vegetation of the Equator.

† Seward, *Fossil Plants as Tests of Climate*, London, 1892, p. 29.

‡ Reid, *The Origin of the British Flora*, London, 1899, p. 36.

Northern genera which occur in the mountains of tropical Asia and Malaysia,
Flora 6 in the map.

From the following Table, I have excluded all genera which, however northern, contain species able to live in the Bengal plains or approach sea level at Singapore : this is why such genera as *Cardamine* and *Nasturtium* are not in it. Of the genera remaining *Cerastium* has one species in Mauritius, the others none, unless *Agrostis tropica*, Beauv., can be proved good.

TABLE 15.—Species of northern genera within the Tropics of Asia.

	Himalaya.	Indian Peninsula.	Ceylon.	Siam.	Malay Peninsula.	Sumatra.	Java.	Borneo	East Malaysia.
<i>Anemone</i> —									
<i>rivularis</i>	H	D	C	S	..	S	..	..
<i>sumatrana</i> . . . . .	..	..	..	S	..	S	..	..
<i>Thalictrum</i> —									
<i>javanicum</i>	H	D	C	..	..	S	J	..	
<i>saniculæforme</i> . . . . .	..	D	..	..	..	..	..	..
<i>Dalzellii</i> . . . . .	..	D	..	..	..	..	..	..
<i>Ranunculus</i> —									
<i>diffusus</i>	H	..	..	..	..	S	J	..	
<i>reniformis</i> . . . . .	..	D	..	..	..	..	..	..
<i>sagittifolius</i> . . . . .	..	..	C	..	..	..	..	..
<i>subpinnatus</i> . . . . .	..	D	..	..	..	..	..	..
<i>javanicus</i> . . . . .	..	..	..	..	..	S	J	..	
<i>wallichianus</i> . . . . .	..	D	C	..	..	..	..	..
<i>Lowii</i> . . . . .	..	..	..	..	..	..	..	B	Celebes.
<i>muricatus</i>	H	D	..	..	..	..	..	..
<i>pennsylvanicus</i>	H	..	..	..	..	..	J	..	
<i>Viola</i> —									
<i>Patrinii</i>	H	D	C	S	..	S	J	..	
<i>serpens</i>	H	D	..	S	..	S	J	B	
<i>malvina</i> . . . . .	..	..	..	..	..	S	..	..
<i>distans</i>	H	D	..	..	..	..	..	..
<i>arouata</i>	H	..	..	..	..	..	J	..	
<i>sumatrana</i> . . . . .	..	..	..	..	..	S	..	..
<i>alata</i> . . . . .	..	..	..	..	..	..	J	..	
<i>Stellaria</i> —									
<i>paniculata</i>	H	D	..	..	..	..	..	..
<i>drymarioides</i> . . . . .	..	..	C	..	..	..	..	..
<i>saxatilis</i>	H	D	..	..	..	..	J	..	
<i>media</i>	H	D	..	..	..	..	J	..	
<i>pauciflora</i> . . . . .	..	..	..	..	..	..	J	..	
<i>uliginosa</i>	H	D	..	..	..	..	..	..
<i>Cerastium</i> —									
<i>indicum</i> . . . . .	..	D	C	..	..	..	J	..	
<i>glomeratum</i>	H	D	..	..	..	..	J	..	
<i>Arenaria neelgherrensis</i>	H	D	..	..	..	..	..	..
<i>Linum mysorensis</i>	H	D	C	..	..	..	..	..

TABLE 15.—*Species of northern genera within the Tropics of Asia—contd.*

	Himalaya.	Indian Peninsula.	Ceylon.	Siam.	Malay Peninsula.	Sumatra.	Java.	Borneo.	East Malaysia.
Reinwardtia—									
<i>trigyna</i>	H	D	..	S	..	..	..	..
<i>tetragyna</i>	H	D	..	..	..	..	..	..
Geranium nepalense	H	D	C	..	..	..	J	..	
Alchemilla—									
<i>indica</i> . . . . .	..	D	C	..	..	..	..	..
<i>villosa</i> . . . . .	..	..	..	..	..	..	J	..	
Agrimonia—									
<i>zeylanica</i> . . . . .	..	..	C	..	..	..	..	..
Eupatoria . . . . .	..	..	..	..	..	..	J	..	
Potentilla—									
<i>mooniana</i>	H	..	C	..	..	..	..	B	
<i>leschenaultiana</i>	H	D	..	..	..	..	..	..
<i>kleiniana</i>	H	D	C	..	..	..	..	..
<i>supina</i>	H	D	..	..	..	..	..	..
<i>leuconota</i> . . . . .	..	..	..	..	..	..	..	B	
<i>parvula</i> . . . . .	..	..	..	..	..	..	J	B	Celebes. N. Guinea.
Poterium indicum . . . . .	..	..	C	..	..	..	..	..
Cotoneaster buxifolia	H	D	..	..	..	..	..	..
Parnassia—									
<i>wightiana</i>	H	D	..	..	..	..	..	..
<i>mysorensis</i> . . . . .	..	D	..	..	..	..	..	..
Tillaea pentandra	H	D	..	..	..	..	..	..
Circaea alpina	H	D	..	..	..	..	..	..
Sanicula europaea	H	D	..	..	M	S	J	B	
Heracleum—									
<i>hookerianum</i> . . . . .	..	D	..	..	..	..	..	..
<i>rigens</i> . . . . .	..	D	C	..	..	..	..	..
<i>aquilegifolium</i> . . . . .	..	D	..	..	..	..	..	..
<i>ceylanicum</i> . . . . .	..	D	C	..	..	..	..	..
<i>candolleianum</i> . . . . .	..	D	..	..	..	..	..	..
<i>sprengelianum</i> . . . . .	..	D	..	..	..	..	..	..
<i>courtallense</i> . . . . .	..	D	..	..	..	..	..	..
<i>concanense</i> . . . . .	..	D	..	..	..	..	..	..
<i>pedatum</i> . . . . .	..	D	..	..	..	..	..	..
<i>Pinda</i> . . . . .	..	D	..	..	..	..	..	..
Aralia—									
<i>malabarica</i> . . . . .	..	D	..	..	..	..	..	..
<i>filicifolia</i> . . . . .	..	..	..	..	..	S	..	..
<i>montana</i> . . . . .	..	..	..	..	..	..	J	..	
<i>ferox</i> . . . . .	..	..	..	..	M	..	J	B	
<i>dasyphylla</i> . . . . .	..	..	..	..	..	S	J	..	
<i>javanica</i> . . . . .	..	..	..	..	..	..	J	..	
Rubia—									
<i>cordifolia</i>	H	D	C	..	..	S	J	B	
<i>siamensis</i> . . . . .	..	..	..	S	..	..	..	..
Galium—									
<i>javanicum</i>	H	D	..	..	..	..	J	..	N. Guinea.
<i>asperifolium</i>	H	D	C	..	..	..	..	..
<i>subtrifidum</i> . . . . .	..	..	..	..	..	S	J	..	
<i>cuspidatum</i> . . . . .	..	..	..	..	..	..	J	..	

TABLE 15.—Species of northern genera within the Tropics of Asia—contd.

	Himalaya.	Indian Peninsula.	Ceylon.	Siam.	Malay Peninsula.	Sumatra.	Java.	Borneo.	East Malaysia.
Galium—									
junghuhnianum . . . . .	..	..	..	..	..	..	J	..	
Valeriana—									
Hardwickii	H	..	..	..	M	S	J	..	
arnottiana . . . . .	..	D	..	..	..	..	..	..
Moonii . . . . .	..	..	C	..	..	..	..	..
hookeriana . . . . .	..	D	..	..	..	..	..	..
Leschenaultii . . . . .	..	D	..	..	..	..	..	..
Beddomei . . . . .	..	D	..	..	..	..	..	..
Dipsacus—									
Leschenaultii . . . . .	..	D	..	..	..	..	..	..
Walkerii . . . . .	..	..	C	..	..	..	..	..
Anaphalis—									
cinnamomea	H	..	C	..	..	..	..	..
fruticosa . . . . .	..	..	C	..	..	..	..	..
Beddomei . . . . .	..	D	..	..	..	..	..	..
adnata	H	..	..	S	..	..	..	..
elliptica . . . . .	..	D	C	..	..	..	..	..
margaritacea . . . . .	..	..	..	S	..	..	..	..
Thwaitesii . . . . .	..	..	C	..	..	..	..	..
travancorica . . . . .	..	D	..	..	..	..	..	..
notoniana . . . . .	..	D	..	..	..	..	..	..
subdecurrens . . . . .	..	D	..	..	..	..	..	..
leptophylla . . . . .	..	D	..	..	..	..	..	..
Lawii . . . . .	..	D	..	..	..	..	..	..
aristata . . . . .	..	D	..	..	..	..	..	..
Meeboldii . . . . .	..	D	..	..	..	..	..	..
wightiana . . . . .	..	D	..	..	..	..	..	..
Bournei . . . . .	..	D	..	..	..	..	..	..
zeylanica . . . . .	..	..	C	..	..	..	..	..
marcescens . . . . .	..	D	C	..	..	..	..	..
brevifolia . . . . .	..	D	C	..	..	..	..	..
neelgerryana . . . . .	..	D	..	..	..	..	..	..
javanica . . . . .	..	..	..	..	..	S	J	..	
viscida . . . . .	..	..	..	..	..	..	J	..	
Artemisia—									
parviflora . . . . .	..	D	..	..	..	..	..	..
vulgaris	H	D	C	..	M	S	J	..	
Carduus Wallichii	H	D	..	..	..	..	..	..
Ainsliaea pteropoda	H	..	..	S	..	S	J	..	
Pratia—									
montana	H	..	..	..	..	S	J	..	
nummularia	H	..	..	S	..	S	J	..	
borneensis . . . . .	..	..	..	..	..	..	..	B	
Campanula—									
canescens	H	D	C	..	..	..	..	..
ramulosa . . . . .	..	D	..	..	..	..	..	..
Wightii . . . . .	..	D	..	..	..	..	..	..
Alphousii . . . . .	..	D	..	..	..	..	..	..
fulgens	H	D	C	..	..	..	..	..
Primula imperialis . . . . .	..	..	..	..	..	S	J	..	

TABLE 15.—Species of northern genera within the Tropics of Asia—concl'd.

	Him'aya.	Indian Peninsula.	Ceylon.	Siam.	Malay Peninsula.	Sumatra.	Java.	Borneo.	East Malaysia.
Gentiana —									
<i>quadrifaria</i>	H	D	C	S			J		
<i>hessliana</i> . . . . .	..	..	..	..	..	..	..	..
<i>sumatrana</i> . . . . .	..	..	..	..	..	S	..	..
<i>lateriflora</i> . . . . .	..	..	..	..	..	..	..	..	Celebes
<i>laxicaulis</i> . . . . .	..	..	..	..	..	..	J	..	
<i>borneensis</i> . . . . .	..	..	..	..	..	..	..	B	
<i>malayana</i> . . . . .	..	..	..	..	M	..	..	..
<i>Clementis</i> . . . . .	..	..	..	..	..	..	..	B	
<i>lycopodioides</i> . . . . .	..	..	..	..	..	..	..	B	
Pedicularis —									
<i>Perrottetii</i> . . . . .	..	D	..	..	..	..	..	..
<i>zeylanica</i> . . . . .	..	D	C	..	..	..	..	..
Brunella vulgaris .	H	D	..	..	..	..	..	..
Elaeagnus latifolia	H	D	C	..	..	S	J	..	
Luzula campestris	H	D	..	..	..	..	..	..
Agrostis —									
<i>canina</i>	H	D	..	..	..	..	..	B	
<i>peninsularis</i> . . . . .	..	D	..	..	..	..	..	..
<i>Reinwardtii</i> . . . . .	..	..	..	..	..	..	J	..	
<i>rigidula</i> . . . . .	..	..	..	..	..	..	J	..	
<i>infirmis</i> . . . . .	..	..	..	..	..	S	J	B	
Calamagrostis —									
<i>pilosula</i>	H	D	C	..	..	..	..	..
<i>Schmidtii</i> . . . . .	..	D	..	..	..	..	..	..
<i>javanica</i> . . . . .	..	..	..	..	..	..	J	..	
<i>Deyeuxia</i>	..	..	..	..	..	..	J	..	
<i>epileuca</i> . . . . .	..	..	..	..	..	..	..	B	
Avena —									
<i>aspera</i>	H	D	C	..	..	..	..	..
<i>polyneura</i> . . . . .	..	D	..	..	..	..	..	..
<i>Junghuhnii</i>	H	..	..	..	..	S	J	..	
Bromus —									
<i>asper</i>	H	D	..	..	..	..	..	..
<i>insignis</i> . . . . .	..	..	..	..	..	..	..	B	
Brachypodium sylvaticum .	H	D	C	..	..	..	J	..	
Festuca —									
<i>nubigena</i> . . . . .	..	..	..	..	..	..	J	..	
<i>gigantea</i>	H	..	..	..	..	..	J	..	
Species possessed in common with the Himalaya	49	40	19	6	3	16	27	5	
Species possessed which are not in the Himalaya.	..	47	17	4	2	9	20	10	
TOTAL . . . . .	..	87	36	10	5	25	47	15	
Percentage of Non-Himalayan species.	..	54	47	40	40	36	43	67	

In an earlier map I have given the very interesting distribution of the genus *Pinus* in south-eastern Asia, showing that it too, penetrates into the mountains of Malaysia,—in Malaysia approaching the Equator as it does nowhere else.

Snow at sea level approaches nearer to the Equator within this Pine area than in any other part of the world.

Out of 49 Himalayan species of undoubtedly temperate genera, in Table 15, which are found in the mountains of the tropics, 40 or nearly 82 per cent. appear on the mountains of the Deccan ; 27 in Java ; 19 in Ceylon ; 16 in as yet very inadequately known Sumatra ; 6 in the Malay Peninsula, that is to say on Gunong Tahan and some other mountains ; 5 in Borneo on Kinabalu ; and 3 in northern Siam, where Doi Sutep offers a rather unsuitable summit.

The same genera have developed into 47 non-Himalayan species, which occur in the mountains of the Deccan, eight of which are also in Ceylon ; 20 in Java (of which four are also in Sumatra and three in Borneo, while none reappear in the Deccan nor in Ceylon) ; 17 in Ceylon ; 10 in Borneo ; 9 in Sumatra ; 4 in the Malay Peninsula ; and 2 in northern Siam. There is no reason for thinking that there has been any lateral migration between the mountains of the Deccan or Ceylon and the mountains of Sumatra or Java : but into Malaysia there may well have been two routes for these northern plants, one *via* Burma to Sumatra and on to Java ; the other *via* Formosa and the Philippine Islands to Borneo, and it is possible that in Borneo the two routes have met ; to Borneo, Bonthain peak in Celebes seems to owe the origin of some of its plants. New Guinea has very little in common with the Himalaya.

The proportion of species endemic along the three routes in these figures is :—

First route, Deccan and Ceylon	56 out of 107 or 52 per cent.
Second route, Siam, Malay Peninsula, Sumatra, Java	28 „ „ 58 or 48 „ „
Third route, Borneo, Celebes	11 „ „ 16 or 69 „ „

Greater isolation of northern species in the Deccan-Ceylon area than towards Malaysia.

It is interesting that the Deccan-Ceylon route should show a slightly higher percentage of endemism than the Siam-Sumatra-Java route ; but the figures are small unfortunately, so that further investigation may alter them. However there is the same course of climatic changes behind this apparently lesser development of endemism (lesser isolation of the plants under discussion) to the east side of the Bay of Bengal and the spreading of *Pinus* down to Sumatra.*

* The reported occurrence of *Pinus* in Borneo is not accepted. 4

The greater endemism in the Deccan-Ceylon area in Malaysian affinity than in northern affinity, points to an establishment of Malaysian Rain-forest flora in Ceylon-Malabarica earlier than the establishment there of the northern type.

It is more interesting, still, that the endemism of the northern genera along the Deccan-Ceylon route should be very much less than the endemism in south India and Ceylon of the Malaysian Rain-forest genera, which get there, for the difference is one of the grounds for a belief that the Malaysian genera were in southern India and Ceylon before the Glacial Period brought the progenitors of the species of northern type down thither. At the time when the Malaysian genera were passing into endemic species, most of the small endemic Rain-forest genera enumerated on p. 176 would have taken their origin.

The Malaysian type passing north of the Bay of Bengal would have access to the area of flora 3 until a drier climate severed it.

If, and there is no obvious alternative view, it be considered that the Malaysian floras and the Ceylon-Malabarica flora got what they have in common by, at one time, an extension round the Bay of Bengal, which extension would be earlier than the formation of the Ganges-Brahmaputra delta, what they have further in common with the flora of north-east India and northern Burma could be an acquisition of the same time; and so it appears, therefore, not essential to look for a later migration across "the Bengal mud" and the centre of India, of species now common to Abor-land and Malabarica with Ceylon, but absent between, except should special cases require a different explanation. Such a connection of the rain-forest floras round the Bay of Bengal was pre-Glacial; it later by a drying became divided and the Glacial disturbance whatever it amounted to would act upon the floras quite unequally in the three areas.

Both the drying and the Glacial Period would be adverse to the extension westward along the Himalaya, of the Rain-forest.

This same drying of the centre of India would restrict the Rain-forest flora in its extension westward along the Himalaya and could begin the work of keeping low that endemism of the chain in Rain-forest species, which has been noticed, and which can also be ascribed to the compression against the plains in the Glacial Period.

Did the Glacial Period let *Pinus* into the plains of India? and if so, how far? We greatly need investigation upon this point.†

† Troup in the Indian Forest Memoirs, Vol. 1, p. 1 (1916), records that *Pinus longifolia* "has been planted more or less successfully outside its natural habitat in various Indian plains stations, even in Calcutta; it has also been planted on the Nilgiris, on the Raigarh plateau of the Balaghat district, Central Provinces, and elsewhere," suggesting that conditions in these places are not remote from those it demands wild.

Abor-land genera which extend to America.

The true Malaysian flora has stood a poor chance of passing into America round the north of the Pacific by the Behring Straits bridge; but the flora no. 3 of the map shows a number of genera which appear to have been able, in some warm period, to use the bridge, whether as American genera which crossed westward or as Asiatic genera which crossed eastward. When they crossed the bridge its climate must have been subtropical and fairly humid. If the Camel crossed it, as is supposed, its climate at that time would seem to have been dry, and the plants which last had the use of it, before it became broken, appear upon the other hand to have been temperate forest plants, such as *Aralia quinquefolia* and *Coptis Teeta*. It would have been earlier than the crossing by the camel that the bridge served for the passage to and from America or Asia, of Abor-land genera such as some in the Ternstroemiaceae, Magnoliaceae or Symplocaceae, which have acquired very interesting limits.

The genera of the Abor-land flora which are in Asia and America, without reaching Africa are :—

Magnolia.	Hydrangea.
Talauma	Pentapanax.
Eurya.	Pratia.
Saurauia	Symplocos.
Dicentra.	Callicarpa.
Cedrela	Polygonatum.
Microtropis	Disporum.
Meliosma	Spiranthes.
Gymnocladus.	Arundinaria.
Pachyrrhizus	Podocarpus.
Leucaena.	Lindera.

Out of these the following are much more American than Asiatic :—*Spiranthes*, *Leucaena*, *Cedrela* (of which the Asiatic species make the section *Toona*), *Dicentra*, *Magnolia*, *Polygonatum* and *Disporum* : and the following are much more Asiatic than American :—*Castanopsis* with one species in the New World (but then the genus is not very well parted from *Castanea*), *Microtropis* and *Lindera* each with 2 species only ; and *Pentapanax* with three.

The following genera reach the Levant and Europe as well as America :—*Smilacina*, *Styrax*, *Euonymus* and *Celastrus*.

Also, as having been able to cross the Behring Straits, are to be counted, the following genera of northern type which occur in Abor-land :—*Clematis*, *Ranunculus*, *Cardamine*, *Nasturtium*, *Sisymbrium*, *Viola*, *Drymaria*, *Hypericum*, *Rhamnus*, *Aesculus*, *Gleditschia*, *Prunus*, *Rubus*, *Fragaria*, *Potentilla*, *Chrysosplenium*, *Sanicula*, *Pimpinella*, *Aralia*, *Sambucus*, *Viburnum*, *Rubia*, *Galium*, *Anaphalis*, *Gnaphalium*, *Artemisia*, *Saussurea*, *Lactuca*, *Sonchus*, *Prenanthes*, *Vaccinium*, *Rhododendron*, *Pieris*, *Lobelia*, *Lyssimachia*, *Cynoglossum*, *Veronica*, *Calamintha*, *Paris*, *Stachys*, *Ajuga*, *Plantago*, *Chenopodium*, *Polygonum*, *Daphne*, *Elaeagnus*, *Celtis*, *Morus*, *Ulmus*, *Urtica*, *Betula*, *Quercus*, *Salix*, *Populus*, *Juncus*, and *Carex*.

Abor-land Genera which extend to Africa.

The genera which occur in Asia and in Africa, but not beyond, make rather a long list, and this is perhaps at first surprising, when the contrast between the humidity of Abor-land and the dryness of most of Africa is in mind. The names of these genera are in the following table.

TABLE 16.—*Abor-land genera which reach Africa but not America.*

	Africa.	India, without Teneserin.	China.	Malaysia.	Pacific.	Percentage strength in Africa.	Per-centage strength in India.	Percentage strength in Malaysia.	The part of Africa where in genera chiefly Malaysian or Indian appear.
<i>Genera of over 100 species.</i>									
Loranthus . . .	307	57	39	207	82	45	8	30	
Grewia . . .	213	33	10	57	15	63	10	17	
Pandarus . . .	90	22	10	155	55	27	7	47	
Elaeocarpus . . .	16	28	25	189	57	5	9	60	1 Socotra : the res Mascarene.
Medinilla . . .	30	7	1	251	11	10	2	83	1 west coast : the rest Mascarene.
Plectranthus . . .	193	39	52	10	5	64	13	3	
Strobilanthes . . .	3	161	68	52	3	1	57	19	Madagascar.
Memecylon . . .	85	41	4	118	2	34	16	47	
Oberonia . . .	1	53	11	164	16	1	22	68	Mascarene.
Calanais . . .	10	34	23	182	6	4	14	77	
Canthium . . .	152	13	7	46	18	66	6	20	
Macaranga . . .	90	10	2	89	27	42	5	42	
Coleus . . .	155	8	5	29	2	75	4	14	
Millettia . . .	79	35	48	26	2	40	18	13	
Lasianthus . . .	14	37	13	120	..	8	20	65	Mascarene and across Equa- torial Africa.
Thunbergia . . .	167	11	5	3	2	92	6	2	
Elatostema . . .	16	32	8	111	29	9	17	60	
Gardenia . . .	47	17	9	52	46	27	10	30	
Tylophora . . .	42	23	28	46	23	26	14	28	
Evodia . . .	14	4	24	79	29	9	3	52	
Polyalthia . . .	8	16	6	111	4	5	11	76	
Embelia . . .	39	18	26	62	4	27	12	42	
Leucas . . .	95	37	2	7	1	66	26	5	
Maesa . . .	16	19	21	66	14	12	14	40	
Mallotus . . .	9	20	19	74	4	7	16	58	
Blumea . . .	14	36	21	53	5	12	31	46	
Amorphophallus . . .	35	10	14	38	..	35	10	38	
<i>Genera of over 50 species</i>									
Bridelia . . .	43	10	7	17	6	49	11	19	
Claoxylon . . .	52	10	..	31	10	59	11	35	
Leea . . .	3	27	7	51	3	3	31	59	

TABLE 16.—*Abor-land genera which reach Africa but not America—contd.*

	Africa.	India, without Teneserim.	China.	Malaysia.	Pacific.	Percentage strength in Africa.	Percentage strength in India.	Percentage strength in Malaysia.	The part of Africa wherein genera chiefly Malaysian or Indian appear.
<i>Genera of over 50 species—contd.</i>									
Osbeckia . . .	24	44	4	8	2	28	51	9	
Vangueria . . .	77	1	..	4	..	95	13	5	
Alyxia . . .	4	3	6	30	35	5	4	38	Mascarene.
Trichodesma . . .	49	5	3	..	..	71	7	..	
Musa . . .	23	10	10	17	7	34	15	25	
Argyreia . . .	13	28	10	13	..	20	43	20	
Gynura . . .	15	7	14	28	1	24	11	44	
Melastoma . . .	1	5	11	48	5	1	8	74	Mascarene.
Dillenia . . .	1	8	8	42	1	2	13	68	
Alstonia . . .	8	3	3	23	28	14	5	39	
Smithia . . .	36	13	7	2	1	63	23	5	
Olea . . .	25	9	3	6	8	45	16	11	
Balanophora . . .	1	6	19	22	4	2	11	41	Comoros: Sey- chelles.
Melodorum . . .	2	6	12	28	4	4	11	53	W. Africa.
Ligustrum . . .	?	12	34	3	1	?	22	6	
Pothos . . .	1	6	5	39	1	2	12	75	Madagascar.
<i>Genera of over 20 species.</i>									
Glycine . . .	32	2	2	5	6	65	4	10	
Adinandra . . .	?	4	9	31	..	?	8	65	W. Africa.
Momordica . . .	33	3	1	6	..	73	77	13	
Acanthus . . .	25	6	2	3	1	62	15	2	
Rungia . . .	12	15	4	10	..	29	37	24	
Wendlandia . . .	?	13	7	12	2	?	32	30	
Lettsomia . . .	?	17	4	11	..	?	42	27	
Pueraria . . .	3	17	13	5	3	8	45	13	
Clausena . . .	5	8	7	14	2	14	22	39	
Exacum . . .	10	16	4	1	..	28	44	3	
Stereospermum . . .	17	9	1	9	..	49	26	26	
Chasalia . . .	21	1	..	10	2	62	3	29	
Stephania . . .	5	7	10	16	5	15	21	47	
Hiptage . . .	1	4	13	15	1	3	12	44	Madagascar.
Ventilago . . .	2	6	9	11	6	6	19	34	
Flemingia . . .	5	15	5	10	2	16	48	32	
Phrynium . . .	3	5	4	18	1	10	16	58	
Wrightia . . .	5	7	5	12	5	15	21	36	
Atylosia . . .	2	16	2	4	6	8	57	15	Mauritius and Madagascar.
Mezoneuron . . .	5	5	2	15	4	19	19	55	
Peristrophe . . .	9	8	2	11	..	33	30	41	
Acrua . . .	18	6	..	3	1	69	23	12	
Tinospora . . .	1	3	4	15	3	4	12	62	
Toddalea . . .	19	2	1	4	..	80	8	17	
Pollia . . .	4	4	3	8	4	18	18	36	
Achyrospermum . . .	18	1	..	2	..	86	5	10	

TABLE 16.—*Abor-land genera which reach Africa but not America—concl'd.*

	Africa.	India, without Tenasserim.	China.	Malaysia.	Pacific.	Percentage strength in Africa.	Percentage strength in India.	Percentage strength in Malaysia.	The part of Africa wherein genera chiefly Malaysian or Indian appear.
<i>Genera of over 10 species.</i>									
Microglossa . . .	17	8	2	1	..	..	..	..	W. Coast. Madagascar.
Actephila . . .	1	1	..	9	5	..	..	..
Forrestia . . .	2	2	..	6	..	..	..	..
Porana . . .	3	7	6	2	1	..	..	..
Carallia . . .	2	3	1	11	2	..	..	..
Brucea . . .	6	2	1	6	2	..	..	..
Debregeasia . . .	1	5	2	6	..	..	..	..
Melia . . .	2	6	1	5	2	..	..	..
Rhinacanthus . . .	9	3	1	1	..	..	..	..
Heritiera . . .	1	3	2	3	..	..	..	..
Dichrocephala . . .	5	4	4	1	..	..	..	..
<i>Genera of under 10 species.</i>									
Dumasia . . .	2	2	5	2	..	..	..	..
Shuteria . . .	1	4	3	1	..	..	..	..
Girardinia . . .	3	1	2	1	..	..	..	..
Holmskioldia . . .	4	1	..	..	..	..	..	..
Deeringia . . .	2	1	..	1	2	..	..	..
Leeanthus . . .	1	1	..	1	1	..	..	..

These genera belong clearly to two groups, for some belong to an African flora, which is subject to distinct dry seasons, and others to a Rain-forest flora. This Rain-forest flora we may connect with the Lemurs, which curious animals do not live apart from forests. Lemurs are most abundant in Madagascar, occur across Africa, reappear in Ceylon and, in one genus, in Malaya. The Sclaters, in their *Geography of Mammals*, 1899, pp. 104, 108, and 151, suggest that between Madagascar and Ceylon they passed *via* the north side of the Arabian Sea, *via* Africa, whence Madagascar obtained its mammal fauna. We must assume with this that at one date there existed a Rain-forest climate around the north side of the Arabian Sea; and we may go a step further, and conclude that the climate thereby put the final touches to the community of vegetation requiring warm humid conditions, which exists between southern India with Ceylon and Africa with its islands.

If the Rain-forest conditions be held as allowing the Lemuridae to attain their Malagassy-Malaysia distribution, the occurrence of quite a considerable series of genera, such as, *Nepenthes*, *Campnosperma*, *Tantourisa*, *Erythrospe*

mum, etc., in Madagascar, as in Malaysia seems to require no further explanation.

Only a few genera common to Abor-land and Africa do not reach Malaysia.

The Abor-land genera, which occur in Africa but not in America, are with very few exceptions, also, in Malaysia. The exceptions are *Trichodesma*, and *Holmskioldia*, both essentially African genera, though *Trichodesma* in *T. zeylanicum* reappears in Australia. In Africa it goes right across the Continent and from the Mediterranean to South Africa. *Holmskioldia* however is restricted to the Eastern side. Both genera, as found in India, are associated with dry hills and with deciduous forest, rather than with Rain-forest; and *T. khasianum* in Abor-land, grew among shingle.

It would seem then that if a genus can stand the climate of Abor-land and has had opportunities of passing between Abor-land and Africa, it, in general, has also had opportunities of occurring in Malaysia.

The relative strength of various Genera in Malaysia, India and Africa.

In the list there are six genera whose strength in Malaysia is 66·6 per cent. and more,—*Medinilla*, *Oberonia*, *Calamus*, *Polyalthia*, *Melastoma*, *Dillenia* and *Pothos*. Of them *Medinilla* stands out on account of its not inconsiderable development in Africa. It has one species in Fernando Po, the rest being Mascarene, chiefly in Madagascar. The other five genera are only just African. *Oberonia*, which is very well developed in all the Rain-forest areas of India, has one species through Mascarenia. *Calamus*, which is like it as regards India, has its African species in the western Rain-forest area of Africa. *Polyalthia* has a few species upon each side. *Melastoma* is recorded in the wide-spread *M. malabathricum* for the Seychelles and Africa. *Dillenia* is in Madagascar in one species, and so is *Pothos*.

With their strength in Malaysia between 50 and 66 per cent. are the following genera:—*Elaeocarpus*, *Lasianthus*, *Elatostema*, *Evodia*, *Mallotus*, *Leea*, *Melodorum*, *Adinandra*, *Phrynium*, *Mezocurion* and *Tinospora*. Except *Evodia*, they are all more Indian than African. Whether *Adinandra* reaches Africa at all has to be questioned. *Leea*, *Tinospora* and *Elaeocarpus* do not reach it in strength.

Genera with their strength in Malaysia between 25 and 50 per cent. taken as a whole, are on the other hand about twice as strong in Africa as in India, but some are preponderatingly African. We get among them *Pandanus*, *Gynura*, *Alstonia*, *Embelia*, *Peristrophe*, *Amorphophallus*, *Gardenia*, and *Tylophora* with more species in Africa than in India; and we get *Stephania*, *Blumea*, *Maesa*, *Clausena*, *Wrightia*, *Pellia*, *Ventilago*, *Hiptage*, *Balanophora*, *Lettsonia* (?), *Mecocylon*, *Wendlandia* and *Flemingia* with more species in India than in Africa. *Pandanus* is peculiarly weakly represented in India; and so also is *Alstonia*.

Genera strong in India.

There are in the Table ten interesting genera with a greater number of species in India than in any other of the regions considered, the most striking of which is *Strobilanthes*. *Strobilanthes*, in fact, particularly appears to have developed under such conditions as characterise Assam and North Burma, for it is credited with 161 species in India, 68 in China with Indo-China and Siam and 52 in Malaysia, while it is carried to Africa by but 3 species and into the Pacific by 3 also.

Osbeckia, *Argyreia*, *Rungia* and *Exacum* with more species in India than elsewhere have at the same time a considerable development in Africa and are not Rain-forest genera.

Lettsomia and *Atylosia* are more eastern than western: *Ligustrum* is rather Chinese and *Pueraria* is rather Khasia-Chinese.

Genera markedly African.

Africa possesses the large percentage of 66.6 and over, in nine genera. Three Labiatæ are among them,—*Coleus*, *Leucas* and *Achyrospermum*, (*Plectranthus* just misses inclusion); two Rubiaceæ,—*Canthium* and *Vangueria*; the Acanthaceous *Thunbergia* which is greatly developed in the grass-countries of Africa, in the section *Meyenia*; the Cucurbitaceous *Momordica*; *Aerua* of the Amarantaceæ and *Toddalea* of the Rutaceæ.

The following genera have fewer species in India than in Malaysia,—*Coleus*, *Toddalia*, *Momordica*, *Vangueria* and *Achyrospermum*: but the reverse is the case in *Thunbergia* and *Aerua*.

Genera with over 50 per cent. of their species African, but not as many as 66.6 per cent, may be more Indian than Malaysian or the reverse, e.g.

(a) more Indian than Malayan, *Smithia*, *Acanthus*, *Plectranthus* and *Leucas*.

(b) More Malaysian than Indian, *Glycine*, *Chasalia*, *Canthium*, *Claoxylon* and *Grewia*.

These genera are largely genera of relatively dry regions and so to speak have insinuated themselves into Rain-forest regions.

It is clear that they could not have in general utilised the forest conditions that suited the extending Lemurs for passing between the one continent and the other. Their distribution in India is in most of them more western than eastern, e.g., *Smithia* (except for some widely distributed species). *Leucas*, *Canthium*, *Claoxylon* and *Grewia*. *Acanthus* except for its maritime species is montane and rather eastern; and *Chasalia* is also eastern.

Genera with lesser percentages in Africa may be more Indian than Malaysian *Millettia* and *Olea*: or more Malayan than Indian,—*Macaranga*, *Musa* and *Bridelia*: or evenly divided,—*Stereospermum*.

The Rain-forest areas in Africa may at one time have been extensive and must have been more extensive than now: but from very far back in the

history of the Spermatophyta, it, in general, has had a dry climate : wherein apparently it evolved its numerous genera of terrestrial orchids, now so characteristic, and in the possession of which it is such a contrast to Malaysia and South America.

The survey of the genera leaves us with the following as representing the Rain-forest flora of the Malaysian type :—*Medinilla*, *Oberonia*, and *Pothos*, epiphytes ; *Calamus*, *Mezoneuron* and *Tinospora*, climbers ; *Polyalthia*, *Dillenia* and *Melodorum* forest trees of first to second rank ; *Lasianthus*, forest shrubs ; *Leea*, *Mallotus* and *Melastoma*, woody plants often successful by reason of breaks in the forest ; and *Elastostema* and *Phrynium* forest herbs. It is not a very long list.

A period when a Rain-forest flora could pass north of an Arabian Sea seems to have been Miocene.

Geologists tell us that the union of Madagascar to Africa became broken during the Miocene age. Accepting that, and if the Lemurs passed between Madagascar and Asia, *via* the African mainland, and round the north of a sea where now the Arabian Sea is, then, the Miocene, as a period of their considerable extension in Africa, becomes a likely time for their spread to Asia ; and it would appear that the Miocene Rain-forest in Asia spread northwards over the whole of the then-existing India, so as to pass round the seas that bounded the Deccan both east and west, *i.e.*, to the north of latitude 20°N. It may also be said that at one period it went yet much further north ; for genera, such as *Gordonia* including *Haemocharis* (now found in the West Indies, in Venezuela and in contiguous parts of South America as well as in Malaysia), and *Eurya* (just a little less wide), and other forest plants appear to have been able to cross the Behring Straits bridge in latitude 60° N., together with various forest animals, such as the early apes of the Prosimiidae, and this in the Miocene Period.

It is to be remembered, that humidity as well as warmth, is necessary for the Rain-forest, and a drying of the climate is as fatal to it as a lowering of temperature. It is most likely, that want of humidity limited the Miocene Rain-forest before want of warmth; and that it was an extension of an adjoining dry climate that cut the route between Africa and India. I offer no opinion upon the possibility of the spread forthwith into Miocene India, but there seems to be good reason, as has already been mentioned, to think that a dry climate ruled in north-western India towards the end of the Pliocene, and at that time, the dry conditions may have been so wide spread in Asia, on the north side of the tropics as to extend to the Behring Straits bridge. However, as Engler showed forty years ago, (*Versuch einer Entwicklungsgeschichte der Pflanzenwelt*, Leipzig 1879, I. p. 26) woodland species seem to have been among the last wanderers, across the bridge, which broke down in the Pleistocene Period at a time when it was temperate to arctic.

The dry conditions, which I assume to have cut the Miocene Rain-forest of Africa, apart from the Miocene Rain-forest of Asia, persisted until the Glacial Period produced a new and intenser barrier by the descent of cold to the shores of the Arabian Sea the cold bringing down temperate genera, giving them access to equatorial mountains, and compressing that flora, which needed a dry heat, between its invading temperate plants and the fringe of tropical Rain-forest which clung to the southern end of India and Ceylon. That this Rain-forest survived, we know; its survival makes us to assume, that the effect of the glaciation in the north was rapidly lost towards the Equator; for, if it were otherwise, by what means could the Rain-forest have held on?*

The effect of the Pleistocene Glacial Period upon India is not, as yet, thoroughly worked out; but, in 1910, Mr. J. D. LaTouche published a most interesting paper entitled "*Relics of the great Ice Age in the Plains of Northern India*" (Geological Magazine, N. S. Decade V, vol. 7) in which he gives evidence of glaciers in the Himalaya, where the present lower limits are at 11,000 to 13,000 ft. having at one time descended to 7,000 ft.

When the glaciers so descended the plants which occupied the lower mountains, must to a proportionate degree have been driven lower or onto the plains.

The invading genera of Northern type which got into the tropical mountains of Asia in the Glacial Period.

The genera enumerated on p. 181 as northern genera furnishing species to the mountains of southern India, Ceylon and Malaysia, have their lower limits in the Himalaya, as follows:—

Anemone . . .	4,000 ft.	Rubia . . .	Edge of Himalaya.
Thalictrum . . .	3,000 ft.	Galium . . .	Panjab plain.
Ranunculus . . .	Panjab plain, etc.	Valeriana . . .	4,000 ft.
	(R. sceleratus lower)	Dipsacus . . .	6,000 ft.
Viola . . .	Panjab plain.	Anaphalis . . .	4,000 ft.
Stellaria . . .	4,000 ft.	Artemisia . . .	Panjab plain.
Cerastium . . .	6,000 ft.	Carduus . . .	6,000 ft.
Arenaria . . .	Plains of upper India.	Ainsliaea . . .	5,000 ft.
Linum . . .	Edge of Himalaya.	Pratia . . .	2,000 ft.
Reinwardtia . . .	Edge of Himalaya.	Campanula . . .	Edge of Himalaya.
Geranium . . .	Edge of Himalaya.	Primula . . .	4,000 ft.
Alchemilla . . .	8,000 ft.	Gentiana . . .	Edge of Himalaya.
Agrimonia . . .	3,000 ft.	Pedicularis . . .	5,000 ft.
Potentilla . . .	Edge of Himalaya.	Brunella . . .	4,000 ft.
Poterium . . .	5,000 ft.	Elaeagnus . . .	2,000 ft.
Cotoneaster . . .	1,500 ft.	Luzula . . .	9,000 ft.
Parnassia . . .	4,500 ft.	Agrostis . . .	Edge of Himalaya.
Tillaea . . .	Edge of Himalaya.	Calamagrostis . . .	5,500 ft.
Circaea . . .	7,000 ft.	Avena . . .	Edge of Himalaya.
Sanicula . . .	4,000 ft.	Bromus . . .	5,000 ft.
Heracleum . . .	5,000 ft.	Brachypodium . . .	6,000 ft.
Aralia . . .	Edge of Himalaya.	Festuca . . .	5,000 ft.

* The guess once made to account for Glacial Periods, that Space varies in coldness in different parts, and that our solar system might at times suffer from entering into these colder parts, would require that the Equator be too much cooled for the persisting of an equatorial flora, and is not one that can be upheld.

Out of them the following are the most interesting as descending least :—

- Luzula*, descending to 9,000 ft., has a Himalayan species in the Deccan.
Alchemilla, descending to 8,000 ft., has an endemic species in the Malabar-Ceylon area and another in Java.
Circaea, descending to 7,000 ft., has a Himalayan species in the Malabar area.
Cerastium, descending to 6,000 ft., has a species *C. indicum* in the Malabar-Ceylon area and in Java.
Dipsacus, descending to 6,000 ft., has an endemic species in Malabar and another in Ceylon.
Carduus, descending to 6,000 ft., has an endemic species in Malabar.
Brachypodium, descending to 6,000 ft., has a Himalayan species in the Malabar-Ceylon area and in Java.
Poterium, descending to 5,000 ft., has an endemic species in Ceylon.
Heracleum, descending to 5,000 ft., has ten endemic species in the Malabar-Ceylon area, eight being confined in Malabar.
Ainsliaea, descending to 5,000 ft., has a species common to the Himalaya and Siam, Sumatra and Java.
Pedicularis, descending to 5,000 ft., has an endemic species in Malabar.
Calamagrostis, descending to 5,000 ft., has one Himalayan species reaching Malabar and Ceylon, one endemic in the Deccan, one in Java and one in Borneo.
Bromus, descending to 5,000 ft., has one Himalayan species extending to the Deccan, and one endemic species in Borneo.
Festuca, descending to 5,000 ft., has one Himalayan species in Java, and one endemic species there also.
 Total—29 species of which 17 are endemic in the Malabar-Ceylon area, 5 in Malaysia, and 1 is absent from the Himalaya while present in both of the other areas.

Common to the Himalaya and the Malabar-Ceylon area.	4
Endemic in the Malabar-Ceylon area	17
	21
Percentage endemic	81
Common to the Himalaya and Malaysia	2
Endemic in Malaysia	5
	7
Percentage endemic	71

The extent of migration compelled by the Glacial Period.

The Pleistocene Glacial Period must have had oscillations in India as it had elsewhere ; and probably that oscillation recognised in Europe as the second

and severest was in India more severe than the others. Several oscillations followed. The severest would seem to have been that which chiefly gave the genera not found in the Himalaya say, below 5,000 ft. access to the mountains to the southward: the later oscillations not producing so great a downward movement as say, 5,000 ft. vertically, but according to their intensity breaking the isolation of the less distinctly temperate species and leading to an arrest of their evolution into new species: so that of the genera which in these days do not descend in the Himalaya below 5,000 ft., 81 per cent. of the Malabar-Ceylon species are endemic, whereas of those which descend below 5,000 ft., 53 per cent. are endemic.

As the methods of plant-dispersal whereby we see devastated island reclothed with vegetation, helped without doubt the genera named in their southward journeys, it is not necessary to conceive the Panjab plain as so cold that species now only found in the North-western Himalaya above 9,000 ft. actually existed on it, in order to march across to the hills of the Deccan: they quite possibly leaped the plains from their lowest elevations: but that they were aided towards the distribution, which they have got by the Glacial Period will not be contradicted.

It is impossible to estimate nicely to what extent they were aided: but we have the evidence that Himalayan glaciers once came some 4,000 ft. lower than they do now and may assume that species descending below 5,000 ft. would then have a very good chance in the uniform humidity of the Glacial Period of persisting in favourable parts of the Plains. The temperature on the slopes of the North-western Himalaya decreases 59°C . for every 100 m. mounted and the average at 5,000 ft. is therefore 8.2°C . (46.8°F .) below that of the Plains: but, in the Glacial Period, with the air moisture-laden, the temperature upon the slopes would assimilate itself rather to the Bengal conditions where only 52°C . are lost with each 100 m. ascended; so that 5,000 ft. is 7.2°C . (45°F .) below the plains. If then we make the not-unreasonable supposition that species from 5,000 ft. and below were driven down on the plains, and we suppose at the same time that the temperature of the plains had been lowered on the average by 7.8°C . then as Isotherms round the world 7.8°C . apart between the 20th and 40th degrees N. would appear to be equal to about 12° Lat.; the Glacial Period may be regarded as having driven the flora of Abor-land, altitude for altitude, to the latitude of Rangoon. Such a calculation is however of the crudest; and it is given here merely as an indication of the possible. With warm-temperate species in the then humid Panjab plain the driving of the tropical Rain-forest from out of the Himalaya

* Within the Indian area is Barren island, a splendid object for the study of re-vegetation as it would seem to have been as devastated as Krakatoa, and has advanced further on the road to recovery. The work of Sir David Prain upon it (*Journ. Asiatic Soc. Bengal* lxi, part 2, 1893, pp. 39-86, and *Proc. for May 1891*, pp. 84-87) ought now to be followed up.

would be fairly well achieved, and the dry-climate flora that may have existed in the Plains in the Pliocene would be sorely tried.

After the Glacial Period any returning Rain-forest might have found somewhat better conditions than now westward, because Central Asia is drying up,* and with that, there is an increasing dryness in the Himalaya ; at the same time the work of man in devastation is nowhere in the world more evident and more intense than in the plains of India, whose bared soil must surrender the rain it receives at a most unnatural rate.

“ *The Age and Area Hypothesis.* ”

It happens that Dr. J. C. Willis founded his “ Age and Area Hypothesis ” upon one of the Floras that I have had cause to compare in the above pages with the flora of Abor-land, namely the Ceylon half of the Ceylon-Malabarica flora. In two papers of great interest he has shown that Dr. Trimen’s estimate of the abundance or rarity of the species of the Ceylon flora has a very interesting relationship to the spread beyond Ceylon of those species. He has shown that the species which are confined to Ceylon have a narrower range in Ceylon than the species which are confined to Ceylon and the Deccan Peninsula, and that these again have an average narrower range than the species which are found still wider. His figures are so interesting that I extract the following from his Table II on p. 3 of the *Annals of Botany*, Vol. XXX (1916) :—

Classed by Trimen as in Ceylon.	Confined to Ceylon.		Not extending beyond the Deccan.		Extending beyond.	
	spp.	per cent.	spp.	per cent	spp.	per cent.
Very common . . .	19	6·66	45	15·79	221	77·54
Common	90	13·43	118	17·60	462	67·95
Rather common . . .	139	25·04	103	18·55	313	56·39
Rather rare	136	31·70	84	19·58	209	48·71
Rare	192	46·26	64	15·42	159	38·31
Very rare	233	51·20	78	17·20	144	31·65
Total	800		492		1,508	

The foundations of the Table may be, as Mr. Ridley criticises,† an imperfect knowledge of the flora of Ceylon ; but rareness and commonness being relative,

* La Touche might have cited this drying up, as one of the circumstances leading to the present victory of the Brahmaputra over the Ganges in the Bengal plains, in addition to his other reasons.

† Ridley in *Annals of Botany*, XXX, p. 551, 1916.

the estimate made by Trimen is acceptable : and Dr. Willis' figures as an approximation hold good ; but the reason which he gives for endemics being found over narrower areas in Ceylon than species widely spread beyond Ceylon, namely that the endemics are new species which have not had time to spread, will not in its simplicity satisfy me at all. On his own showing his figures for endemics are figures for Rain-forest species, and, though he does not bring the point out, his figures for wides are a mixture of species of all sorts of conditions, dry and wet, agrestal and forest, so that he has contrasted species for which the area suited is obviously limited with species for which the area suited is wide, and therefrom comes the obvious order in his results. ' Age and area ' will not do : ' opportunity and area,' age being one factor in opportunity, furnishes a better theorem. The Miocene age furnished a climate which permitted the lands now Ceylon and Southern India to be occupied by a Rain-forest vegetation which was like that occupying lands now Malaysian, and probably continuous : climates changed,—cut the two areas apart, and from that Age the flora developed along lines which have led to the differences observable to-day: the climate continued to become more adverse to the Rain-forest in the Ceylon-Malabar area, compressed it, so that as regards some of the species which Dr. Willis represents as not having had time to spread, what we see may be nothing but the result of the very reverse process.

We know well that there are in the World, species which have persisted from the Miocene and therefore this is quite possible.

On the other hand, we must admit that species are ever under evolution, and that such new species live, as all species do, in a perpetual effort to widen their range. If their vigour is such, and if climatic conditions change in a way that favours their physiological constitution, or if in their evolution they acquire a constitution suiting a more wide-spread climate, they stand to extend.

As to the Ceylon-Malabar area, I do not recognise any modern increase of moist conditions such as would let the Rain-forest extend : while upon the other hand, just as Central Asia is distinctly drying up, so the west side of India would seem to be somewhat drier ; and added to whatever external influence there may be on the climate is the internal one of the attack of man upon the vegetation. This view leaves nothing for Ceylon Rain-forest Evolutions but a change of physiological nature* as a means of getting wider distribution, wherein seeing that the morphological characters upon which as a rule we (for our convenience) found species, are more mutable than physiological nature, the species that changes its nature is probably changed in its morphological characters, and therefore we should call it by another name, —I mean that it would find another position in tables such as the one just quoted.

*Orobanche furnishes 'perhaps the very first instance among Spermatophyta of two species which are to be distinguished by physiological characters, having no morphological characters that serve, namely the Orobanche of tobacco and the Orobanche of mustard.

Humid conditions in the area of Flora 3 seem to have lasted long enough to have been a barrier to Flora 4.

The conclusions have been arrived at, that, as regards Southern India with Ceylon, the elements of three floras can be detected among the species of Spermatophytes occurring there—(1) a rain-forest element (flora 2 on the map) which was present in the Miocene, and continued to develop peculiarities up to the present time, (2) a dry climate element (flora 4 on the map) which later closed in upon the first, and took possession of much land that the first could not continue to hold, and (3) a northern element (flora 6 on the map) which was let in by the Glacial Period and was enabled to cling to the mountains when it passed away : and it is time to try to apply the story of the past read in the better known area to the region in which Abor-land lies.

In the first place the Miocene Rain-forest would seem to have extended far to the north of Abor-land during the time when a subtropical condition enabled plants now common to subtropical North America and subtropical eastern Asia to cross the Behring Straits land-bridge. Adequate warmth, at any rate at that time would appear to have existed in Abor-land : but it is more difficult to get evidence of adequate humidity. The problem I have approached in this way. Firstly, let it be recalled that Abor-land lies in the wettest part of that Rain-forest belt, which is here called the Cupuliferous boundary line. If such a Rain-forest belt can be demonstrated as established from the Miocene to the present time, our interest in it will be greatly increased and our deductions simplified.

As a means of approaching this question, I have extracted from Mr. J. F. Duthie's "Flora of the Upper Gangetic Plain"* a list of the dicotyledonous species, which he shows to occur away from the foot of the Himalaya, *i.e.*, those which there support a really dry climate : the number comes to 848. From Sir David Prain's "Bengal Plants" and using my own diaries which are rather extensive for the lower Gangetic Plains, I have ascertained that there is record of 484 of these in wet Bengal and of a further 46 in the western transitionary-districts of Bengal, making a total of 530 which are able to support the dryness of the Upper Gangetic Plain, as well as the moisture of Bengal. Of these 530—

67 or 12·69 % do not overpass Bengal eastwards

145 or 27·46% overpass Bengal south eastwards, but do not enter China,

316 or 59·84% overpass Bengal and enter China.

Removing the 484 species whose conditions of life do not prevent their existence in the moister climates of Bengal, there are left 318 species as a dry-flora element ; out of them 186 are Indian or Afro-Indian and penetrate Asia no further than the Upper Gangetic Plain or Behar or Chota-Nagpur or Orissa. It is to be assumed that the humidity of Bengal limits their spreading.

* Flora of the Upper Gangetic Plain and of the adjacent Siwalik and Sub-Himalayan tracts, Calcutta 1911.

Setting aside these 186 species from the balance of 318, there are left 132 among which are 15 species recorded from the Malay Peninsula, but not from Bengal. As they in the Malay Peninsula support a great deal of humidity, they must be removed from the total, like the 484, before we have left a group of plants demanding dry conditions for their existence and passing east of Bengal. These 15 may be named before proceeding and are :—

Name.	In Malaya.	How near Bengal.
<i>Casjera Rheedei</i> <i>Murraya exotica</i>	Malacca and Pahang wide, but often connected with man.	approaches in Behar. approaches in Behar and Chota-Nagpur.
<i>Brythrina suberosa</i>	possibly just at the N. limit.	approaches all along the west side.
<i>Cassia obtusifolia</i>	various places, following man.	approaches in Chota-Nag- pur.
<i>Cassia leschenaultiana</i> <i>Hedyotis pinifolia</i> <i>Oldenlandia dichotoma</i> <i>Siegesbeckia orientalis</i> <i>Leptadenia reticulata</i> <i>Merremia tridentata</i>	Penang and Singapore fairly wide, following man fairly wide, following man fairly wide, following man Singapore, (teste Lobb.) near ports, following man	... approaches all along West approaches all along West approaches all along West ...
<i>Merremia hastata</i> <i>Ehretia laevis</i>	along the coasts northern half of Peninsula	approaches in Behar and Chota-Nagpur. approaches in Orissa. approaches in Behar and Orissa.
<i>Ipomoea pes-tigridis</i>	in Penang and Malacca	approaches in Behar and Chota-Nagpur.
<i>Justicia diffusa</i>	in Penang and Johore following man.	approaches in Behar and Chota-Nagpur.
<i>Ficus retusa</i>	wide	approaches in Behar.

Removing the 15, there are left 117 species,—dry climate plants found east of the Cupuliferous boundary line, and, also, further west than those already cut out of our list.

Out of them 31 reach Burma, the centre of which is dry, and go no further eastwards; 9 more occurring in Burma reappear in Java, the east part of which shows a trace of the dryness of north-west Australia; 9 more are in Java without record at present for Burma, and 18 reach Australia; *all 67 being absentees from China*. They therefore appear not to have crossed the Cupuliferous boundary line, but rather to have worked along its south-western face. Entering China are 50 others—

4 species are common to the drier parts of India and to China, but are not in Burma nor in Java, nor in Australia.

17 species with the same distribution, and extending westwards into Africa.

15 species are common to the drier parts of India and China and occurring also in Burma; 8 of them reaching Africa, and 5 Australia.

7 species common to the drier parts of India and to China, at the same time reaching Java, 3 of them occur in Africa.

7 species common to the drier parts of India and to China, being also in Burma and Java, 4 reaching Africa and 2 Australia.

These 50 on analysis are found to be of two series :—the one series, those species which do not reach Burma, Java and Australia ; the other those which do. Among the first are the following :—*Sisymbrium Irio*, *Sisymbrium thalianum*, *Silene conoidea*, *Arenaria serpyllifolia*, *Malva parvifolia*, *Peganum harmala*, *Matricaria chamomilla*, *Vicoa sativa*, *Samolus valerandi*, *Erythrea ramosissima*, *Convolvulus arvensis*, *Solanum incanum*, *Plantago amplexicaulis*, whose obviously northern relationships suggest that they reached both India and China from the north ; so that for them no breaking of the Cupuliferous boundary line is required.

As to the other dry-climate plants which appear in Burma, Java and Australia, dispersal seems to have been possible along the coasts of the Indian Ocean, where an extension of the cold marine currents making west Australia dry could be a cause for dryness in land placed where Timor, Flores, Bali, Java and Sumatra now are.* It has been stated, just above, that 36 species of the dicotyledons of the Upper Gangetic Plains pass south-eastwards to Java and Australia without touching China, and we have another 19 which, to the same distribution, add China.

What with the obviousness of a route by which a species of plant may have reached both India and China from the north, and with indications that dry-climate plants may have been able to pass east and west between India and the latitudes of China along a southern route, there remains no sufficient evidence for supposing a direct hot dry-climate route through the middle of the Cupuliferous boundary line. In fact, the last three lines of the Statement, p. 200, contain only 29 plants which is scarcely 3·5 per cent. of the 848 with which we started.

Whereas the poverty in species of the endemic genera of the parts of Asia within which Abor-land is, indicates that the existing relatively warm very humid conditions have been disturbed in Geological times it is far easier to ascribe this disturbance to the Glacial Period, than to discover that the climate at any time after the Miocene sufficiently dried up to prevent rain-forest evolution, though the Irrawaddy valley did get a touch of the Siwalik fauna. I presume, therefore, that the Abor-land flora is part of a previously existing Abor-land flora, which was driven south by the Glacial Period and allowed to return subsequently.

Of the 303 really dry-climate dicotyledonous plants of the Upper Gangetic Plain :—

- 186 or 61·39% show arrest eastward by the humidity of Bengal,
- 67 or 22·11% show a distribution south-eastward, not into China,
- 50 or 16·52% reach China,

which is a reversal in order of the figures on p. 199.

If to the annuals, the species be added which can get their reproduction through in a year, the percentage of short-lived plants among the dry climate species common to the Gangetic Plains and China is found to be 52,

* See Burkill and Hoittum in *Gardens' Bull. Straits Settlements*, III, 1923, p. 20.

or of those which belong to the group of northern character, 71—a high percentage, because it is the cold weather of northern India which enables them to live as cold weather weeds, the hot weather or rains excluding species demanding the same temperature and dryness over more months.

The humid conditions perennial, but the precipitations seasonably variable.

The peculiar flora of the river-bed, which has been described on pp. 36-39 because its existence depends absolutely upon the waters varying in height, points to the present changes in the precipitations: and as several of the species in it are of such restricted distribution as to suggest development locally, long duration of these seasonable changes is indicated. The same seasonal changes seen in the Dihang, have been doubtless well established for a long period in the upper Salween, Yangtze and neighbouring rivers of south-western China.

Two seasons per annum, to the north and east, three to the south and west, of the Cupuliferous Boundary line: but the colder of the two seasons is a time of growth equally with the warmer.

The conditions under which this vegetation exists comprise seven months for growth with five months submerged, and the year in that way gives two seasons, of which the colder is their season of growth. The vegetation has therefore more of a subtemperate than an Indian aspect, or is more akin to the climate north and east of the Cupuliferous boundary line where two seasons in the year rule, than to the climate south and west with three seasons in the year.

PART VIII.**Enumeration of the Lower Plants.**

The Algae collected are being enumerated by Dr. Nellie Carter in a paper which she is publishing.

MYXOMYCETES (arranged after Lister).**Trichiaceae.**

Hemitrichia serpula, Rost. A Myxomycete in distribution probably world-wide as to the warmer regions : found on the bark of a tree (in Zone 3) at Janakmukh in December (37305).

Arcyriaceae.

Arcyria denudata, Sheldon. A Myxomycete in distribution, world-wide in tropics and temperate regions, found (in Zone 1) on a fallen branch at Koto (35938).

Perichaena depressa, Libert. A Myxomycete, probably world-wide : found (in Zone 3) on the bark of a tree at Janakmukh in December (37305 bis),

**EUMYCETES-EUASCOMYCETES (arranged after Engler's
Pflanzen familien.)****Helvellaceae.**

Morehella sp. A morel fungus of a light fawn colour : found (in Zone 3) upon a sunny slope north of Janakmukh camp (37205).

Pezizaceae.

Peziza sp. A small orange species common (in Zone 4) on the droppings of mithan about Yambung camp (37704).

Hypocreaceae.

Hypocrea insignis, Berk. & Curt. A saprophytic fungus : found (in Zone 1) at Kobo upon a dead trunk (37102).

Dothideaceae.

Dothideacea. A fungus parasitic upon *Scleria elata* (in Zone 4) upon "Signal hill" above Yambung camp (37710).

BASIDIOMYCETES (arranged after Engler).**Pucciniaceae.**

Puccinia Thwaitesii, Berk. & Br. A parasite on *Justicia Gendarussa*, in distribution Indo-malaysian and very common through India : found on its usual host (in Zone 1) at Sadiya (35782).

Auriculariaceae.

Auricularia tremellosa, Pekh. : *Laschia tremellosa*, Fr. A fungus, pale amber in colour, in distribution Indo-malaysian and to Australia : found (in Zone 1) on a tree trunk at Kobo (35988).

Polyporaceae.

Fomes (Amauroderma) rugosus (Nees), Fries. A fungus, in distribution Indo-malaysian : found (in Zone 3) on bare earth above Renging camp (36341).

Polyporus arcularius (Batsch), Fries. A smoke coloured fungus, in distribution from Europe to Australia (in Zone 4) : found on a rotten fallen branch in forest by the mouth of the Side river at 900 ft. or 274 m. (36067).

Polystictus nephelodes (Lév.), Cooke. A saprophytic fungus, in distribution wide : found (in Zone 3) above Balek at 2,000 ft. or 610 m. upon a fallen log, its upper surface a rich purplish brown, its lower white (36894).

Lenzites repanda, Fries. A saprophytic fungus, in distribution wide in the tropics : found (in Zone 1) on a log in deep shade at Kobo (35936).

Agaricaceae.

Leptota dolichaula, Berk. & Broome. In distribution wide in the old world. A mushroom not uncommon in the grazing land at Sadiya in August (32659).

Lycoperdaceae.

Lycoperdon spp. Puff-balls : found (in Zone 1) upon the Kemi chapri (38221) and a different species (in Zone 4) among mosses upon stones at the upper flood limit of the Dihang by the mouth of the Side river (37633).

Cookeina insititia (Berk. & Curt.), O. Kuntze. A saprophytic fungus : found (in Zone 1) at Kobo as a flesh-coloured cup on dead wood in December (35940).

FUNCI IMPERFECTI.

Stilbaceae.

Atractium flammeum, Berk. & Rav. A parasitic fungus, in distribution through the northern Hemisphere : found (in Zone 4) on the upper branches of a tree of *Terminalia myriocarpa* at the mouth of the Side river at 900 ft. or 274 m. appearing from under flakes of loose bark (36070).

Hyalospora sp. A parasitic fungus : found (in Zone 3) upon the fronds of *Nephrodium molle* at Renging camp at 2,000 ft. or 610 m. killing them (36331).

ASCOLICHENES.

Stictaceae.

Ricasolia discolor, Nyl. A lichen, in distribution Mascarene islands and India : found (in Zone 3) at Renging camp on twigs (36662).

BRYOPHYTA-HEPATICAÆ (arranged after Engler).**Marchantiaceae.**

Cyathodium aureonitens (Griff.), Schiffn. A liverwort growing on rocks, in distribution wide; found (in Zone 4) in the gorge of the Yambung stream at 900 ft. or 274 m. on rocks (37717).

Dumortiera hirsuta, Nees. A terrestrial liverwort, in distribution wide through the tropics: found on the banks of streams where splashed by water and in other such damp spots (in Zone 3) by the Janak stream on sandstone at 900 feet or 274 m. (37301 ter) and (in Zone 4) at Rotung (36710), and between Puak and the Side stream on volcanic rocks at 1,000 ft. or 305 m.

Marchantia spp. Two species of this genus were found, sterile, in the Abor Hills, descending into the bed of the Dihang below upper flood limit (in Zone 3) at Janakmukh, one seeming to prefer damper places than the other (37152 and 37153), and (in Zone 4) what are believed to have been the same two species were found again in the Side river at its mouth (37632) as well as in the Dihang at Yambung camp.

Again a *Marchantia*, whether the same species as either of those in the river or not was unascertained, was found (in Zone 3) sterile at Renging camp (36684) and on earth (Zone 4) on the edge of the clearings of Pangi village (37780).

Jungermanniaceae Akrogynae.

Plagiochila oweihiensis, N. & L. A frondose liverwort, in distribution Indo-pacific: found as an epiphyte on a tree stump (in Zone 3) above the Serpo valley (37319 bis).

Chilosecyphus argutus, Nees. A liverwort, growing epiphytically, in distribution wide in the Old World: found (in Zone 3) upon a stump at 1,800 ft. or 549 m. above the Serpo valley (37319 ter).

Chilosecyphus Zollingeri, Gottsche. A liverwort of rocks, in distribution Indo-malaysian and to Japan: (in Zone 3) collected upon the side of the Janak stream (37301 bis), and (in Zone 4) between Rotung and Kalek at 3,300 ft. or 1,006 m. (37577).

Radula assamica, Stephani. A thallose terrestrial liverwort, in distribution Indo-burmese: found (in Zone 3) by the Serpo river at 900 ft. or 274 m. (37676).

Eulejeunea nepalensis, Stephani. An epiphytic liverwort, in distribution Himalayan : found (in Zone 4) on a tree trunk by Kekar-Monying at 800 ft. or 244 m. (36045).

Leptolejeunea Balansae, Stephani. A frondose liverwort, in distribution Indo-malayan : found (in Zone 3) near running water, epiphyllous on the leaves of a Piper at Janakmukh (37258) ; and (in Zone 4) epiphyllous by the side of the Yambung stream at 1,000 ft. or 305 m. (37718).

Jungermannia sp. Found (in Zone 4) between Yambung and Sissin (36015).

Jungermannia sp. An interesting liverwort because of its habitat,—the river bed,—into which it descends between high and low water levels, being one of the terrestrial plants which exists a considerable way down, and so has a relatively short vegetative season when the river is at its lowest. It was found in the exposed Dihang bed (Zone 3) at Janakmukh in abundance (37162) and (Zone 4) under Rotung.

ANTHOCEROTACEAE.

Anthoceros sp. A terrestrial liverwort : found (in Zone 3) by the side of the Janak stream (57297), and (in Zone 4) by the Yambung stream, plentiful in both places.

BRYOPHYTA—MUSCI (arranged after Engler's Pflanzenfamilien).

Dicranaceae.

Trematodon conformis, Mitt. Dixon in Records Bot. Survey Ind., VI, p. 59. A terrestrial moss, in distribution Eastern Himalayan : (in Zone 1) exceedingly common upon the bare earth of Kobo camp (38107).

Dicranoloma reflexifolium, Par. Dixon in Records Bot. Survey India, VI, p. 59. A xerophytic moss, in distribution Assamese : found (in Zone 2) upon a stone at Pasighat (36587) and (in Zone 3) on the rocks of a "razor edge" ridge upon the water-parting of the Serpo and Lalik streams a 5,100 ft. or 1,554 m. (36344).

Leucobryaceae.

Leucobryum javense Mitt. Dixon in Records Bot. Survey India, VI, p. 60. A xerophytic moss, in distribution Assamo-malaysian : found (in Zone 3) on the rocks of a hill top over the water-parting of the Serpo and Lalik streams (36345) at 5,100 ft. or 1,554 m.

Octoblepharum albidum, Hedw. Dixon in Records Bot. Survey India, VI, p. 60. An epiphytic moss in distribution through the tropics : found upon the south side of the trunk of a *Dillenia* (in Zone 1) at Kobo in dense shade (37037).

Fissidentaceae.

Fissidens nobilis, Griff. Dixon in Records Bot. Survey India, VI, p. 61. A terrestrial moss, in distribution Indo-malaysian and in east China : found (in Zone 4) upon the vertical face of a rock growing downwards and outwards towards the reduced light of dense forest on a north exposure above Upper Renging camp at 2,600 ft. or 792 m. (36258).

Fissidens pulchellus, Mitt. Dixon, in Records Bot. Survey India, VI, p. 61. An epiphytic moss, in distribution Eastern Himalayan : found (in Zone 3) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36563).

Fissidens diversifolius, Mitt. Dixon in Records Bot. Survey India, VI, p. 60. A moss of peculiar habitat, namely, the river bed between low water and flood limit, in distribution Himalayan : in the bed of the Brahmaputra (Zone 1) at Kobo it was found adhering to fragments of wood very old and waterlogged, fixed in the stony bed of the river, and to old twigs of *Homonoina*, and near the lowest levels of the water to large stones (37086) ; and (in Zones 3 and 4) in similar situations in the bed of the Dihang and at Janakmukh (37160) and under Rotung.

Pottiaceae.

Barbula comosa, Dozy & Moell. Dixon in Records Bot. Survey India, VI, p. 61. A terrestrial moss, in distribution Assamo-malaysian : found (in Zone 3) on the under cliff by the Dihang below Janakmukh growing upon half-bare gravel wet with spring water (37214).

Orthotrichaceae.

Macromitrium nepalense, Schwaigr. Dixon in Records Bot. Survey India, VI, p. 61. An epiphytic moss, in distribution Assamo-malaysian, and in China: found in the Abor Hills always at low levels and near the river Dihang, (in Zone 3) at Janakmukh on trunks of *Terminalia myriocarpa* (37255) and *Gleditschia* sp. (37185) and (in Zone 4) by the Yambung stream on a tree and extending thence over a rock, at 900 ft. or 274 m. (37723).

Fuariaceae.

Physcomitrium repandum, Mitt. Dixon in Records Bot. Survey India, VI, p. 61. A terrestrial moss, in distribution Assamo-malaysian: found (in Zone 4) on a vertical face of earth near the mouth of the Yambung stream at 900 ft. or 274 m. in fruit in January (37722).

Physcomitrium pulchellum, Mitt. Dixon in Records Bot. Survey India, VI, p. 61. A terrestrial moss, in distribution Assamese: found (in Zone 4) near Rotung on bare soil, with fruit in January (37625).

Rhizogoniaceae.

Rhizogonium spiuiforme Bruch. Dixon in Records Bot. Survey India, VI, p. 62. A moss epiphytic or terrestrial, in distribution more or less world-wide in tropical and sub-tropical regions: found (in Zone 4) in oak forest at 2,700 ft. or 823 m. on a tree trunk in the Lalik valley (37335) and upon a fallen rotten branch at 4,200 ft. or 1,280 m. (36285), with fruit in December and January.

Mniaceae.

Mnium rostratum, Schrad. Dixon in Records Bot. Survey India, VI, p. 62. A terrestrial moss, in distribution almost world-wide in tropics and warm temperate regions: (in Zone 3) not uncommon on the south face of Bapu on rocks under oak forest at 5,400 ft. or 1,646 m. (36541), and (in Zone 4) on a rock above the Igar stream at 3,400 feet or 1,036 m. (36115), and on a prostrate log above Upper Rotung camp at 3,000 ft. or 914 m. (36174).

Mnium succulentum, Mitt. Dixon in Records Bot. Survey India, VI, p. 62. A terrestrial moss, in distribution Assamo-malaysian: found (in Zone 3) in association with a *Jungermannia* upon rocks at Janakmukh (37177).

Bartramiaceae.

Philonotis speciosa, Mitt. Dixon in Records Bot. Survey India, VI, p. 63. A terrestrial moss, in distribution Eastern Himalayan : found (in Zone 3) at Janakmukh camp (36474) and on the river bank by the camp (37171) and below the camp on loose shingle and mud on the undercliff (37213), in fruit in December and January.

Polytrichaceae.

Pogonatum sp. perhaps *P. leucopogon*, Ren. & Card. Dixon in Records Bot. Survey India, VI, p. 63. A terrestrial moss : found (in Zone 3) on the undercliff below Janakmukh where it had a dry stony surface (37215).

Neckeraceae.

Pterobryopsis Wightii (Mitt.), Broth. An epiphytic moss, in distribution Indo-burmese : found (in Zone 2) at the top of a very tall tree of *Beilschmiedia roxburghiana* near Pasighat camp in association with *Campylodontium flavescens* (36859 bis).

Aerobryopsis membranacea, Broth. Dixon in Records Bot. Survey India, VI, p. 64. An epiphytic moss, in distribution Assamese : found (in Zone 4) on a tree trunk at Rotung at 1,300 ft. or 396 m. (37515).

Floribundaria floribunda, Fleisch. Dixon in Records Bot. Survey India, VI, p. 63. An epiphytic moss, in distribution in Madagascar and widely Indo-polynesian : found (in Zone 1) upon the upper side of a leaning half-fallen tree trunk in deep shade at Kobo (37070).

Barbella enervis, Fleisch. Dixon in Records Bot. Survey India, VI, p. 64. An epiphytic moss, in distribution peculiar.—Ceylon, the Abor Hills, Australia and Lord Howe's island : found (in Zone 4) at Puak at 800 ft. or 244 m. (36039).

Meteoricopsis squarrosa, Fleisch. Dixon in Records Bot. Survey India, VI, p. 64. An epiphytic moss, in distribution Indo-malaysian : found (in Zone 4) at Rotung upon the east side of the trunk of a *Stereospermum* at 1,300 ft. or 396 m. (36068).

Trachypodopsis crispatula, Fleisch. Dixon in Records Bot. Survey India, VI, p. 64. An epiphytic moss, in distribution Indo-Malaysian : found (in Zone 3) on trees upon the summit of Bapu at 6,266 ft. or 1,910 m. (36564).

Neckeropsis lepiniana (Mont.), Fleisch. A big moss epiphytic or terrestrial, in distribution Indo-pacific : found (in Zone 3) upon trees at Janakmukh (37279).

Neckeropsis crinita, Fleisch. Dixon in Records Bot. Survey India, VI, p. 64. A terrestrial moss, in distribution Indo-burmese, reaching Tonkin : found (in Zone 4) in association with a liverwort upon boulders in a stream-bed between Yambung and Sissin at 1,000 ft. or 305 m. (36015).

Neckeropsis acutata, Fleisch. Dixon in Records Bot. Survey India, VI, p. 64. An epiphytic moss, in distribution Assamese ; found (in Zone 4) on tree-trunks above the head of the Igar stream at 4,500 ft. or 1,372 m. (36196).

Homalia exigua, Bry. Jav. Dixon in Records Bot. Survey India, VI, p. 65. A terrestrial moss, in distribution Indo-malaysian ; found in association with a liverwort, (in Zone 4) growing upon boulders in a stream entering the Dihang between Yambung and Sissin (36015b).

Homaliodendron flabellatum, Fleisch. Dixon in Records Bot. Survey India, VI, p. 65. An epiphytic moss, in distribution Indo-malaysian and reaching Japan : found (in Zone 4) on tree-trunks in oak forest above the head of the Igar stream at 4,500 ft. or 1,372 m. (36196) and in the Lalik valley at 2,700 ft. or 823 m. (37335).

Symphiodon complanatum, Dixon in Records Bot. Survey India, VI, p. 65. An epiphytic moss, in distribution endemic, found (in Zone 3) on a dead branch which had fallen to the ground, at 5,500 ft. or 1,676 m. on the water-parting between the Serpo and Igar streams (36208).

Symphiodon scabrisetus, Dixon in Records Bot. Survey India, VI, p. 66. An epiphytic moss, in distribution endemic, found (in Zone 4) on a tree-trunk in the Lalik valley at 2,700 ft. or 823 m. (37335 ter).

Entodontaceae.

Campyloodontium flavescens, (Hook.), Bry. Jav. An epiphytic moss, in distribution Indo-malaysian : found (in Zone 2) at the top of a very tall tree near Pasigbat in association with *Pterobryopsis Wightii*, (36859).

Hookeriaceae.

Distichophyllum Griffithii, Par. Dixon in Records Bot. Survey India, VI, p. 66. An epiphyllous moss, in distribution Assamese: growing obliquely forwards and downwards on leaves overhanging a stream, a tributary of the Igar stream at 3,000 ft. or 914 m. (36106).

Hypopterygiaceae.

Cyathophorum Burkillii, Dixon in Records Bot. Survey India, VI, p. 67. An epiphytic moss, in distribution endemic, found (in Zone 4) growing out from tree-trunks near the ground in dense forest at 2,800 ft. or 853 m. on the hill south of the Libang stream (37737).

Hypopterygium flavolimbatum, C. M.: Dixon in Records Bot. Survey India, VI, p. 68. An epiphytic moss, in distribution Himalayan: found (in Zone 3) on a stump at 1,800 ft. or 549 m. above the Serpo river, and (in Zone 4) in the hills south of Rotung on a fallen log at 4,400 ft. or 1,341 m. (36236a).

Leskeaceae.

Leskea perstricta, Dixon in Records Bot. Survey India, VI, p. 68. An epiphytic moss, in distribution endemic, found (in Zone 4) upon a tree-trunk at 1,000 ft. or 305 m. near Rotung (37514).

Haplocladium capillatum (Mitt.) Broth. A moss of decaying tree-trunks in distribution Himalayo-chinese and to Japan, found (in Zone 1) at Pobamukh upon a rotten log (38227).

Haplocladium obscuriusculum (Mitt.) Broth. A moss in distribution Himalayan, found at Renging camp (36617).

Claopodium assurgens, Sull. & Lesq. *C. crispulum*, Broth. Dixon in Records Bot. Survey India, VI, p. 69. An epiphytic moss or on rocks, in distribution Assamo-malaysian and in Formosa, found (in Zone 1) on tree-trunks at Kobo (35939, 37070 bis) and (in Zone 3) on rocks in a stream under Renging camp at 1,800 ft. or 549 m. (38155).

Thuidium trachypodium, Bry. Jav. Dixon in Records Bot. Survey India, VI, p. 69. A moss of various habitats, in distribution Assamo-malaysian. (in Zone 1) on the trunk of a living tree at Kobo (35954) and also on rotting

wood (37104 bis) ; in the Hills (Zone 3) on a tree stump at 1,800 ft. or 549 m. over the Serpo river (37319 quinque), and (in Zone 4) upon a rock at the mouth of the small stream running into the Dihang at Puak at 800 ft. or 244 m. (36038).

Thuidium cymbifolium, Dozy & Molke. Dixon in Records Bot. Survey India, VI, p. 69. An epiphytic moss, in distribution Indo-malaysian and in China to Japan, found (in Zone 4) upon a fallen log in oak forest at 4,400 ft. or 1,341 m. in the hills south of Rotung (36236 bis).

Hypnaceae.

Campylium glaucocarpon, Broth. Dixon in Records Bot. Survey India, VI, p. 70. A moss of tree-trunks, in distribution Assamo-malaysian, found (in Zone 3) by the Janak stream on trunks, largely on loose flakes of bark (37303).

Macrothamsium macrocarpum, Fleisch. Dixon in Records Bot. Survey India, VI, p. 70. A moss of dead wood, in distribution Indo-malaysian, found (in Zone 3) upon the south face of Bapu on a fallen trunk at 3,800 ft. or 1,158 m. (36533) and on decaying trunks at 5,400 ft. or 1,646 m. (36544).

Ectropothecium cyperoides, Jaeg. Dixon in Records Bot. Survey India, VI, p. 70. A moss of various positions, in distribution Indo-malaysian, and to the Caroline islands, found (in Zone 3) on tree-trunks in some plenty at Janakmukh and upon the upper rocks of the bank of the Dihang (37161) on tree-trunks by the Janak stream (37301a, 37302); and (in Zone 4) at 2,500 ft. or 762 m. on logs above Upper Rotung camp (36173). Nos. 37301a and 36173 are the variety *papillosum*, Card. & Dixon in *loc. cit.*

An *Ectropothecium*, probably this, was got also between Rammidambang and the Serpo valley at 1,800 ft. or 549 m. (37310 quater).

Isopterygium taxirameum, Jaeg. Dixon in Records Bot. Survey India, VI, p. 71. A moss terrestrial, in distribution Indo-malaysian, found (in Zone 3) upon sand at Janakmukh (37263).

Vesicularia succosa, Broth. Dixon in Records Bot. Survey India, VI, p. 71. A moss which grows on old wood, in distribution Eastern Himalayan, found (in Zone 1) at Kobo upon a fallen log (37091) and (in Zone 4) in the gorge of the Dihang upon a piece of wood wedged between boulders at 900 ft. or 274 m. (36154).

Vesicularia Montagnei, Broth. Dixon in Records Bot. Survey India, VI, p. 71. A moss growing on old wood, in distribution Assamo-malaysian; (in Zone 1) on fast decaying wood at Kobo (37079, 37104).

Brachytheciaceae.

Rhynchostegium herbaceum, Jaeg. Dixon in Records Bot. Survey India, VI, p. 73. An epiphytic moss, in distribution Eastern Himalaya, common, found (in Zone 1) in the Plains at Kobo (35989, 37070 ter, 37099) upon fallen trunks and on the upper side of the leaning trunk of an overturned tree; and (in Zone 4) in the Hills on fallen trunks and branches near the Dihang between Yambung and Sissin (36012), and over the Igar stream at 3,400 ft. or 1,036 m. upon a decaying stump.

Rhynchostegiella assamica, Card. & Dixon in Records Bot. Survey India, VI, p. 72. A moss of tree-trunks close to the soil or of the ground, in distribution endemic, found (in Zone 4) twice in the immediate neighbourhood of the Dihang river just above high flood limit, once at the rock Kekar-Monying, 800 ft. or 244 m. (36044), and once in the gorge of the Yambung stream at 1,200 ft. or 366 m. upon the stem of a *Ficus pyriformis* and stretching from it over the neighbouring rocks just above the level of the water of the stream (37766).

PTERIDOPHYTA. Filices (arranged after Beddome).

Gleicheniaceae.

Gleichenia linearis, C. B. Clarke. Beddome Ferns Brit. Ind., p. 4, *G. dichotoma*, Hook. A sprawling fern, in distribution Pan-tropic, uncommon in the Abor Hills, found (in Zone 3) over Ealek at 2,000 ft. or 610 m. upon a paths de; by Renging camp at 2,100 ft. or 640 m. upon the edge of a clearing; and (in Zone 4) near Ponging towards Jaru in secondary jungle at 2,500 ft. or 762 m. (36166).

Cyatheaceae.

Alsophila glauca, J. Smith. Beddome, Ferns Brit. Ind., p. 12. A tree fern, in distribution Assamo-malaysian; in the Abor Hills found in isolated individuals in deep shade though often near the edge of forest. It was not

found in the Plains under the Abor Hills although it was found in the Makum forest which is on the Plains but towards the south of the valley. In the Hills (in Zone 3) it was observed upon slopes facing north over the Janak stream (37285), and ascending the slopes of Bapu to 4,000 ft. or 1,219 m., by the Serpo valley to Renging, and (in Zone 4) in the gorge of the Dehong under Rotung (37379) and on the hills over that place and beyond towards Kebang. Large fronds of it were measured and found to be 4 m. long by 1.3 in width.

Diacalpe aspidioides, Blume. Beddome, Ferns Brit. Ind., p. 18. A large tufted fern, in distribution Indo-malaysian, in the Abor Hills appearing on hill-crests, (in Zone 3) above Renging at 4,400 ft. or 1,341 m. (36289), and at 5,100 ft. or 1,554 m. on the water-parting between the Serpo and the Lalik streams (36359); and (in Zone 4) on the hill-crests south of Rotung at about 4,400 ft. or 1,341 m.

Hymenophyllaceae.

Hymenophyllum australe, Willd. *H. javanicum* Spreng. Beddome, Ferns Brit. Ind., p. 32. A very small fern, in distribution Indo-pacific; doubtless very much more common in the Abor Hills than it appears to be from these records: (in Zone 3) at Janakmukh and upon the summit of Bapu at 6,166 ft. or 1,909 m. (36554) in both cases as an epiphyte at about 3 m. from the ground.

Trichomanes bipunctatum, Poir. Beddome, Ferns Brit. Ind., p. 41. *T. filicula*, Bory. A small fern, epiphytic or on rocks, in distribution Pan-tropic: it was found (in Zone 3) at Janakmukh at 700 ft. or 213 m. (37199, 37243) to 3,500 ft. or 1,067 m. upon the south face of Bapu (36528), and (in Zone 4) at Kekar-Monying at 800 ft. or 244 m. (36043). If the air becomes too dry for it, it can curl up and rest without suffering any apparent harm.

Polypodiaceae.

Davallia griffithiana, Hook. Beddome, Ferns Brit. Ind., p. 60. A running fern, in distribution Assamo-chinese; found (in Zone 3) at Janakmukh and (in Zone 4) on rocks upon the bank of the Dihang under Ponging, and epiphytically at Rotung at 1,300 ft. or 396 m. (38177), at Puak in not very heavy shade at 900 ft. or 274 m. (37695) and near Kebang.

Microlepia marginata, C. Chr. Beddome, Ferns Brit. Ind., p. 67 : *Davallia strigosa*, Kze. A tall fern, in distribution Indo-malaysian: found in oak-forest and upon old clearings, thus (in Zone 3) on the south face of Bapu at 4,000 ft. or 1,219 m. (36911) and above Renging camp from 2,200 to 2,400 ft. or 671 m. to 712 m. (36253 bis), and (in Zone 4) above Babuk at 3,100 ft. or 945 m. (37645).

Microlepia hirta, Presl. *M. speluncae*, Linn. var. *hirta*, Beddome, Ferns Brit. Ind., p. 68, *Davallia hirta*, Kaulf. A rather large running fern, in distribution Indo-pacific: found (in Zone 3) at Janakmukh, and over Renging camp, at 2,000 ft. and upwards to the water-parting between the Serpo and the Igar streams at 5,500 ft. or 1,676 m. in oak forest (36210), where few other herbs were present, and (in Zone 4) at 1,000 ft. or 305 m. and at 1,300 ft. or 396 m. (37366, 37606) near Rotung on steep old clearings, and by stream sides.

Adiantum capillus-veneris, Linn. Beddome, Brit. Ind., p. 84. The Maiden-hair fern, in distribution through the wetter Tropics, and Temperate zones; not common in the Abor Hills, but found (in Zone 3) in the deepest part of the Serpo valley, (in Zone 4) on vertical faces of wet rock in the gorge of the Dihang under Rotung (37370), and at flood-limit by Yambung camp.

Onychium siliculosum, C. Chr. *Onychium auratum*, Kaulf. Beddome, Ferns Brit. Ind., p. 96, *Cryptogramme aurata*, Prantl. A tufted fern in distribution Himalayo-malaysian, and on the coast of China; found in the Abor Hills on clearings (in Zone 3) at Janakmukh (37465), and at Rammidambang; and (in Zone 4) under Ponging and at the mouth of the Side river.

Pteris pellucida, Presl. Beddome, Ferns Brit. Ind., p. 106. A tufted fern, in distribution Indo-malaysian: found (in Zone 3) in forest of *Vatica Shingkeng* facing north at Janakmukh at 900 ft. or 274 m. (36501).

Pteris longifolia, Linn. Beddome, Ferns Brit. Ind., p. 106. A tufted fern, in distribution round the world through the Tropics and Sub-tropics: found in the Abor Hills (in Zone 4) excessively plentifully upon the bank of the Dihang at and above flood-limit among the boulders about the mouth of the Side river at 800 ft. or 244 m. (36037). All the plants were sterile in January.

Pteris Griffithii, Hook. Beddome, Ferns Brit. Ind., p. 108. A small tufted fern, in distribution East Himalayan: in the Abor Hills (through Zones 3 and 4) common near and just below upper flood level along the course

of the Dihang from Yambung through Puak, under Rotung and Ponging to Janakmukh (37150), preferring to other situations a place under the shelter of a big boulder. It is evidently a local development connected with the variable height of the rivers.

Pteris quadriaurita, Retz. Beddome, Ferns Brit. Ind., p. 110, var. **Blumena**. A very large tufted fern, in distribution Pan-tropic: in the Abor Hills (in Zone 4) on the hill-face over the Libang stream (37738) at 2,800 ft., or 853 m.

Pteris biaurita, Linn.: *Campteria biaurita*, Hook. Beddome, Ferns Brit. Ind., p. 116. A large tufted fern, in distribution Pan-tropic: common from (Zone 2) Pasighat into the Hills (in Zones 3 and 4) up the Dihang valley generally ascending to 2,800 ft. or 853 m. No. 37752 was collected near the Libang stream.

Pteridium Aquilinum, Kuhn: *Pteris Aquilina*, Linn. Beddome, Ferns Brit. Ind., p. 115. The Bracken, a world-wide fern. It was found in the Abor Hills in three places only. First (in Zone 3) it was upon a very steep place on the south face of Bapu, one plant only at 4,800 ft. or 1,463 m., but 6—7 at 4,700 ft. or 1,433 m. (36964); secondly it was on a hill top just over Renging camp at 2,000 ft. or 610 m. (36832) upon a clearing; and thirdly (in Zone 4) it was on the bank of the Dihang where the Ponging clearings descend to it at 600 ft. or 183 m. and above both on other clearings nearer the village at 1,800 ft. or 549 m., and on those over the mouth of the Yamue river at 2,000 ft. or 610 m. When growing upon clearings it was accompanied by *Saccharum*, but on the south face of Bapu, its associates were other ferns, grasses, *Carex*, *Rubus*, and *Hydrangea*.

Histiopteris incisa, J. Smith: *Litobrochia incisa*, Presl. Beddome, Ferns Brit. Ind., p. 120; *Pteris incisa*, Thunbg. A running fern in distribution Pan-tropic, but in India occurring over a rather restricted area: in the Abor Hills (Zone 4) found only on "Signal hill" over the Yambung camp at 2,000 ft. or 610 m. in one of the clearings which in a way unusual to the Hills, had gone back to *Saccharum* (37712).

Blechnum orientale, Linn. Beddome, Ferns Brit. Ind., p. 132. A tufted fern, in distribution Indo-pacific, found in the Abor Hills (Zone 4) at 1,800 ft. or 549 m. over Rotung, and at 1,500 ft. or 457 m., on "Signal hill" over the Yambung camp (37708).

Asplenium nidus, Linn.: *Thamnopteris Nidus*, Presl. Beddome, Ferns Brit. Ind., p. 137. A tufted fern in distribution in the Mascarene islands

and through tropical Asia Indo-polynesian : a very common epiphyte in upper Assam, and through Zones 1 and 2 ; in Zones 3 and 4 common along the course of the Dihang and ascending the Hills at least to 5,500 ft. or 1,676 m. but much less common on them away from the river. Its highest was by the swamp Ripshing Sieng. It grows best at a height not above the tops of the lesser trees of the forest and down to the ground; and in these Abor forests on the sides of trunks facing north ; when it is successful in a really damp position its cups are very likely to harbour lesser ferns such as *Vittaria*, and sometimes but not often hold Phanerogamic seedlings of the Leguminosae, Anonaceae, Araliaceae, Urticaceae, etc.

Asplenium griffithianum, Hook. Beddome, Ferns Brit. Ind., p. 142. A tufted fern, in distribution Assamo-malaysian, but not penetrating Malaya further than the north of the Malay Peninsula : found (in Zone 4) epiphytically in deep forest at Yambung at 900 ft. or 274 m. (37701).

Asplenium unilaterale, Lamk. Beddome, Ferns Brit. Ind., p. 152 : *Asplenium resectum*, J. Smith. In distribution through the Tropics of the Old World : in the Abor Hills (in Zone 3) in deep shade among rocks at Janakmukh (37195).

Asplenium heterocarpum, Wall. Beddome, Ferns Brit. Ind., p. 153. A creeping fern, in distribution Indo-malaysian and in south-east China : rare in the Abor Hills and found only (in Zone 3) upon the south face of Bapu at 3,500 ft. or 1,067 m. (36527).

Asplenium laciniatum, Don. Beddome, Ferns Brit. Ind., p. 154. A creeping fern, in distribution Indo-burmese and in Japan : found (in Zone 4) above Upper Rotung at 4,500 ft. or 1,372 m. (36821).

Asplenium nitidum, Swartz. Beddome, Ferns Brit. Ind., p. 157. A creeping fern, in distribution in Africa, and as regards Asia Indo-malaysian : found in the Abor Hills as an epiphyte at low levels not above 1,000 ft. or 305 m. In Zone 1 it was in cups of *Asplenium Nidus*, at Kobo (37076) ; in Zone 3 on trees at Janakmukh and (in Zone 4), in the Yambung gorge (37756).

Asplenium achilleifolium, C. Chr. : *Asplenium rutaefolium*, Kunze. Beddome, Ferns Brit. Ind., p. 159. A tufted fern, in distribution in Africa and in Asia Indo-pacific : found upon stumps, tree-trunks, and the like, always close to the ground or on rocks, (in Zone 3) on Bapu above Balek at 2,300 ft. or 701 m. (36522), and above Renging camp at 2,400 ft. or 732 m. (37222), and (in Zone 4) above the head of the Igar stream at 4,500 ft. or 1,372 m. (36199),

Asplenium finlaysonianum, Wall. : *Hemidictyum finlaysonianum*, Hook
Beddome, Ferns Brit. Ind., p. 195. A creeping fern, in distribution Assam-malaysian, found in dense shade (in Zone 3) by the Janak stream (37278) and (in Zone 4) by the Igar stream.

Diplazium bantamense, Blume. Beddome, Ferns Brit. Ind., p. 177 : *Asplenium bantamense*, Baker. A creeping fern, in distribution Indo-malaysian and in China : found in the Abor Hills (Zones 3 and 4) in deep shade from 4,000 ft. to 4,500 ft. or 1,219 m. to 1,372 m., over Renging camp (36283) and over the head of the Igar stream (36193), in the second place in the variety *Listeri*.

Diplazium polypodioides, Blume. Beddome, Ferns Brit. Ind., p. 184 : *Asplenium polypodioides*, Mett. A tufted fern, in distribution Indo-malaysian and in Australia, found (in Zone 1) in dense shade at Kobo (37062) and (in Zone 4) above Upper Rotung camp at 4,700 ft. or 1,433 m. (36806).

Diplazium latifolium, Moore. Beddome, Ferns Brit. Ind., p. 187 : *Asplenium latifolium*, Don. A tufted fern, in distribution Indo-malaysian and to Australia, found (in Zone 1) on the bank of the Brahmaputra at Kobo (35990) and in the Abor Hills (Zone 4) near the Dihang, about and just below flood-limit under Rotung (37369) and at Puak (37677), and again at 2,800 ft. or 853 m. upon the hillside above upper Renging camp.)

Diplazium esculentum, Swartz. *Asplenium esculentum*, Presl. *Anisogonium esculentum*, Presl. Beddome, Ferns Brit. Ind., p. 192. A big tufted fern, in distribution Indo-malaysian : (in Zone 1) very common upon roadsides at Sadiya, and upon old clearings at Pobamukh (37037), then (in Zones 3 and 4) plentiful just below flood-limit along the Dihang at Janakmukh (37155), and up to Yambung except in the deep gorge under Rotung. At Yambung it attained 2.5 m. in height (37719). The Abors call an edible fern O-kang ; but I am uncertain if it is this species.

Polystichum aculeatum, Schott. Beddome, Ferns Brit. Ind., p. 207. A tufted fern, in distribution Pan-tropic, not common in the Abor Hills, where it was found only (in Zone 3) upon a very steep slope of the south face of Bapu at 4,800 ft. or 1,463 m. (36915), a spot offering conditions unusual in the Hills, and alone bearing the bamboo *Dinochloa Maclellandi* ; and again upon a hill-top over Renging camp at 4,200 ft. or 1,280 m. (36290), being one of the very few herbs present.

Polystichum aristatum, Presl. ; *Aspidium aristatum*, Swartz. Beddome, Ferns Brit. Ind., p. 229. A running fern, in distribution Indo-polynesian,

not wide spread in the Abor Hills, found (in Zone 3) in association with *Vatica Shingkeng* near Renging camp between 1,800 ft. or 549 m. (38157) and 2,400 ft. or 732 m. (36253).

Aspidium vastum, Blume. Beddome, Ferns Brit. Ind., p. 212 : *Nephrodium vastum*, Baker. A running fern, in distribution Assamo-malaysian : found (in Zone 1) in considerable shade at Kobo (37092) almost every frond viviparously reproducing.

Aspidium polymorphum, Wall. Beddome, Ferns Brit. Ind., p. 218 : *Nephrodium polymorphum*, Baker. A tufted fern, in distribution Indo-burmese : found (in Zone 1) in the forest at Kobo (35943) and (in Zone 4) in abundance at 4,500 ft. or 1,372 m. above the head of the Igar stream (36194).

Athyrium spectabile, Presl. Beddome, Ferns Brit. Ind., p. 222 : *Nephrodium spectabile* Baker. A tall tufted fern, in distribution Assamo-malaysian, found (in Zone 1) in the edge of forest at Kobo (37084).

Pleocnemia membranifolia, Beddome, Ferns Brit. Ind., p. 225 : *Nephrodium membranifolium*, Presl. A tufted fern, of unusual distribution, in that while being Indo-malaysian, it appears not to occur in the Himalaya. It was found (in Zone 1) in the Plains at Kobo by the side of a path (37084).

Dryopteris dissecta, O. Ktze. : *Lastrea dissecta*, Carr. Beddome, Ferns Brit. Ind., p. 196. A tufted fern of fair size, in distribution in Madagascar and Indo-polynesian : in the Abor Hills (Zone 4) found in oak forest at the top of the ridge over Rotung at 4,700 ft. or 1,433 m. (36812).

Dryopteris cana, O. Ktze. : *Lastrea cana*, Baker. Beddome, Ferns Brit. Ind., p. 238. A tufted fern, in distribution Himalayo-Assamese, with an extension beyond the Bengal Plain in the mountains of the centre of India at Pachmari. It was found (in Zone 3) at Janakmukh at 900 ft. or 274 m. (36399).

Dryopteris ochtodes, C. Chr. : *Lastrea ochthodes*, Beddome, Ferns Brit. Ind., p. 240. A tufted fern, in distribution Indo-malaysian. It is (in Zone 1) a very common fern at Sadiya (32676).

Dryopteris setigera, O. Ktze. : *Nephrodium tenericaule*, Hook. : *Lastrea tenericaulis*, Beddome, Ferns Brit. Ind., p. 266. A tufted fern, in distribution Indo-malaysian and to Australia and through China to Japan, found (in Zone 4) on old clearings covered with *Saurauja* near Rotung at 1,400 ft. or 427 m. (38182).

Dryopteris molliuscula, C. Chr. : *Nephrodium extensum*, Moore. Beddome, Ferns Brit. Ind., p. 269. A running fern in distribution Indo-malayan. It was found (in Zone 1) to be very common upon the banks of the Brahmaputra between Kobo and Pobamukh (28223), and in the Hills (in Zones 3 and 4) along the margin of the Dihang from Janakmukh (37156) and between Rotung and Puak plentifully just below upper flood limit as well as by the Sireng river above its mouth. In such places it seems to produce its spores in the month of January when it is quite safe from submergence.

Dryopteris cucullata, Christ : *Nephrodium cucullatum*, Baker. Beddome, Ferns Brit. Ind., p. 270. A tufted fern, in distribution in the Mascarene islands and Indo-polynesian : found (in Zone 4) on old clearings under a cover of *Saurauja* at 1,400 ft. or 427 m. near Rotung (38181).

Dryopteris mouleimensis, C. Chr. : *Nephrodium mouleimensense*, Beddome, Ferns Brit. Ind., p. 275 : *Polypodium multilineatum*, Wall. A tufted fern of fair size, in distribution Himalayo-pacific, with an extension beyond the Bengal plain in the Circars, etc. In the Plains under the Abor Hills, (Zone 1) this fern was found at Pobamukh (37050), and in the Hills (Zone 4) upon an old clearing at Rotung at 1,400 ft. or 427 m. (38180).

Dryopteris parasitica, O. Ktze. : *Nephrodium molle*, R. Br. Beddome, Ferns Brit. Ind., p. 277. A fern usually tufted, of moderate size, in distribution Pan-tropic. As through Assam generally, so it is common in the Plains under the Abor Hills (Zones 1 and 2) and because the high forest represses it, it is more abundant about the cleared land at Sadiya, than elsewhere ; at Kobo it is near the river chiefly, or on the edge of the Kemi chapri ; (in Zone 3) it was observed at 2,000 ft. or 610 m. near Renging camp, (36331), above the Igar stream at 3,400 ft. or 1,026 m. (36110) and (in Zone 4) it was very plentiful at Rotung (38183) ascending to 2,000 ft. or 610 m. over the Side stream, near Yambung and on clearings over the Libang stream at 2,800 ft. or 853 m. (37739). It is more abundant in Zone 4 than in Zone 3 doubtless because the forest dominates less.

Nephrolepis cordifolia, Presl. Beddome, Ferns Brit. Ind., p. 282 : *N. tuberosa*, Hook. A suberect fern, very commonly epiphytic, in distribution Pan-tropic : not met with in the Plains, but found on entering the Abor Hills (Zone 3) at Janakmukh (37261), and thence forward to Renging camp ; and (in Zone 4) beyond to Rotung. At the latter place it was found making use of the cups of *Asplenium Nidus*.

Phegopteris ornata, Fee. Beddome, Ferns Brit. Ind., p. 294 : *Polypodium ornatum*, Wall. A tall tufted fern, in distribution Indo-polynesian, 2—3 m.

nigh, arching over smaller plants just above flood limit on the Dihang banks (in Zone 4) in the gorge under Rotung at 700 ft. or 213 m. (36233).

Phegopteris punctata, Mett. Beddome, Ferns Brit. Ind., p. 295: *Polypodium rugulosum*, Lab. A creeping fern, in distribution round the World in the Tropics, found (in Zone 3) in Balek village at 1,400 ft. or 427 m. (36575) in the open. The Abors of Balek called it Rug-ji.

Phegopteris prolifera, Kuhn. *Nephrodium proliferum*, Keys. A tufted fern rooting at the frond-tips, in distribution Tropics of the Old World: in the Abor region of peculiar habitat namely river beds where it is covered for a part of the year. It occurs (in Zone 1) in the Brahmaputra at Kobo (37087) and at Pobamukh (38231) as well as in hollows, old river channels, by the Kemi chapri; (in Zone 3) in the Dihang at Janakmukh right down to within 2 m. of extreme low water level; (in Zone 4) under Ponging, under Rotung, and by Yambung camp, reproducing itself vegetatively. It associates with *Homonoia* plentifully.

Monachosorum subdigitatum, Kuhn: *Polypodium subdigitatum*, Blume: *Phegopteris subdigitata*, Beddome, Ferns Brit. Ind., p. 295. A tufted fern, in distribution Assamo-malaysian, found (in Zone 4) on the ground in oak forest above Upper Renging camp at 3500 ft. or 1,067 m. (36276) reproducing itself asexually.

Cyclophorus adnascens, Desv.: *Polypodium adnascens*, Swartz: *Niphobolus adnascens*, Hook. Beddome, Ferns Brit. Ind., p. 325. A wide creeping fern, in distribution in the Mascarene islands and Indo-polynesian: epiphytic (Zone 3) in the tree tops at Janakmukh (37190) and on high trees in the Serpo valley under Renging camp and (in Zone 4) on trees by the bank of the Dihang at Yambung camp.

Cyclophorus nummularifolius, C. Chr.: *Polypodium nummularifolium*, Mett.: *Nophobolus nummulatifolius* Beddome, Ferns Brit. Ind., p. 334. A wide creeping fern, in distribution Assamo-malaysian, epiphytic and often associating itself with *Asplenium Nidus*, (in Zone 1) plentiful in the forests at Kobo (37008) and Pobamukh; (in Zone 3) at Janakmukh (37183) and (in Zone 4) about Rotung (37605). It was not seen above 1,300 ft. or 396 m.

Cyclophorus lingua, Desv. Distributed from Northern-India to Japan and Malaysia. Epiphytic on the bases of tree-trunks, and xerophytic (in Zone 3) upon a "razor edge" ridge over Renging at 4,400 ft. or 1,341 m. (36288).

Coniogramme fraxinea, Diels. *Gymnogramme javanica*, Blume: *Syngramme fraxinea*, Beddome, Ferns Brit. Ind., p. 386. A running fern, in distribution through the Tropics of the Old World: found in the Abor Hills (Zone 4) at the mouth of the Sireng river at 800 ft. or 244 m. (37389).

Polypodium coronans, Wall.: *Drynaria coronans*, J. Smith. Beddome, Ferns Brit. Ind., p. 338. An almost tufted fern, in distribution Assam-malaysian and in China; in the Abor Hills (Zone 3) over Renging, and (in Zone 4) a very common epiphyte over Rotung between 2,000 and 5,000 ft. or 610 and 1,524 m. about the head of the Igar valley and near the Dihang near Yambung camp at 900 ft. or 274 m. Its fronds were turning yellow and falling in March.

Polypodium lineare, Thunb.: *Pleopeltis linearis*, Beddome, Ferns Brit. Ind., p. 346. A wide creeping fern, in distribution through the Tropics of the Old World, epiphytic in the Abor Hills (Zone 3) upon the south face of Bapu at 4,800 ft. of 1,463 m. upon the trees of an exposed ridge (36539).

Polypodium normale, Don: *Pleopeltis normalis*, Beddome, Ferns Brit. Ind., p. 353. A climbing fern in distribution in Madagascar and Indo-malaysian, and in China, epiphytic in the Abor Hills (Zone 3) upon the summit of Bapu at 6,266 ft. or 1,909 m. on tree-trunks for a short distance up from the ground (36557, 36949), and (in Zone 4) in oak forest at 4,500 ft. or 1,372 m. on small bushes at about 2 m. from the soil in chief part, above the head of the Igar.

Polypodium phyllomanes, Christ.: *Polypodium ovatum* Wall. Beddome, Ferns Brit. Ind., p. 354. A tufted fern of the Eastern Himalaya and Assam Hills, epiphytic near the bases of tree-trunks, found in the Plains (Zone 1) at Kobo (37063).

Polypodium membranaceum, Don: *Pleopeltis membranacea*, Moore. Beddome, Ferns Brit. Ind., p. 355. A shortly creeping fern, distributed widely through India, to South China and the Malay islands, collected (in Zone 1) along with *Aspidum vastum* at Kobo (37092 part).

Polypodium punctatum, Swartz. *P. irioides*, Poir.: *Pleopeltis punctata*, Beddome, Ferns Brit. Ind., p. 357. A creeping fern, in distribution through the Tropics of the Old World; in the Abor Hills epiphytic close to the Dihang (in Zone 3) at Janakmukh (37179) and (in Zone 4) at Yambung on large trees at about 6—8 m. from the ground.

Polypodium hemionitideum, Wall. *Pleopeltis hemionitidea*, Beddome, Ferns Brit. Ind., p. 358. A creeping fern, terrestrial, in distribution Indo-malaysian; terrestrial in the Abor Hills (Zone 3) in deep forest from Janakmukh at 700 ft. or 213 m. (37198) to Renging camp (38153) and to 3,500 ft. or 1,067 m. over it both in the shade of *Vatica Shingkeng* and *Vatica* with *Terminalia myriocarpa* intermixed; and (in Zone 4) to 4,700 ft. or 1,433 m. over Rotung, in oak forest near Kebang and also in cut-over forest, and lastly in secondary forest over the Libang stream.

Polypodium pteropus, Blume. *Pleopeltis pteropus*, Beddome, Ferns Brit. Ind., p. 359. A nearly tufted fern, in distribution Assamo-malaysian and in south China, found (in Zone 4) attached to the surface of rocks in deep shade in high forest north of the Side river at 900 ft. or 274 m. (36074).

Polypodium dilatatum, Wall. *Pleopeltis dilatata*, Beddome, Ferns Brit. Ind., p. 367. A creeping fern, in distribution Indo-malaysian; found on mossy rocks in forest of *Vatica Shingkeng* and *Terminalia myriocarpa* below Renging camp at 1,800 ft. or 549 m. (38154).

Polypodium Lehmanni, Mett. *Pleopeltis Lehmanni*, Beddome, Ferns Brit. Ind., p. 370. A fern, in distribution Himalayo-burmese and just into China: epiphytic (in Zone 4) on the edge of the marsh Ripshing Sieng at 5,500 ft. or 1,676 m. (36987).

Polypodium leiorhizum, Wall. *Pleopeltis leiorhiza*, Beddome, Ferns Brit. Ind., p. 372. A wide-creeping fern, in distribution irregular, in southern India and in the Assam region: epiphytic (in Zone 3) between Rammidambang and Janakmukh at 900 ft. or 274 m. (36393).

Polypodium flocculosum, Don. *Niphobolus flocculosus*, Don. Beddome, Ferns Brit. Ind., p. 331. A creeping fern, in distribution Himalayo-assamese; found (in Zone 3) upon an exposed ridge on the south face of Bapu at 4,900 ft. or 1,494 m. (36971). This fern can endure considerable desiccation without taking any damage (*vide* Hope in Journ. Bomb. Nat. Hist. Soc., XV, p. 89).

Polypodium nipponicum, Mett. *Goniophlebium nipponicum*, Beddome, Ferns Brit. Ind., Supplement, p. 90. Var. **Waltii**. A wide-creeping fern, in distribution Assamo-chinese and in Japan; epiphytic with a grey-green rhizome, (in Zone 4) in dense shade at 2,800 ft. or 853 m. in the Lalik valley (56243) and at 4,500 ft. or 1,372 m. over the Igar valley (36198).

Polypodium (§**Goniophlebium**), sp. near *P. amoenum*, Wall. An epiphytic fern collected (in Zone 3) on the south face of Bapu above Balek at 2,600 ft. or 792 m. (36960). The fronds were hanging vertically and had lost their tips. Mr. C. H. Wright has been so good as to report on the plant remarking that with the appearance in cutting and venation of *P. amoenum* it has a naked rhizome, and that all the ferns of that group with the rhizome naked have, as this has not, pubescent fronds.

Dipteris Wallichii, Moore. Beddome, Ferns Brit. Ind., p. 334. *Polypodium Wallichii*, R. Brown. A creeping fern, in distribution Assamese, rare in the Abor Hills, found (in Zone 4) only on the "Razor-edge" ridge between the Lalik and Igar streams at 2,300 ft. or 701 m. in deep shade where the natural drainage by reason of the two slopes is excessive (37525, 38169).

Antrophyum Coriaceum, Wall. *A. reticulatum*, Beddome, Ferns Brit. Ind., p. 401. A shortly creeping fern, in distribution Assamo-malaysian: a common fern (in Zone 1) in the forest at Kobo (35967) and (Zone 3) in the Serpo valley.

Vittaria elongata, Swartz. Beddome, Ferns Brit. Ind., p. 404. A creeping fern, in distribution through the Tropics of the Old World, epiphytic but near the floor of the forest and at times in the cups of *Asplenium nidus*, (in Zone 3) at Janakmukh at 700 ft. or 213 m., and on Bapu above Balek at 2,300 ft. or 701 m. in dark forest (36523). It was not found in the plains just under the Abor Hills but it occurs in the Plains forests to the south side of the top of the Assam valley.

Dryoglossum carnosum, J. Smith. Beddome, Ferns Brit. Ind., p. 411. A small creeping fern, in distribution Assamo-malaysian and in China; epiphytic, in the Plains (Zones 1 and 2) very common from Kobo through Pilung to the foot of the Hills, and in the Hills (Zone 4) over the mouth of the Yamne river. No. 35711 came from the Makum forest which is without my region but was preserved to authenticate the observations on the expedition.

Polybotrya appendiculata, J. Smith. Beddome, Ferns Brit. Ind., p. 424. *Acrostichum appendiculatum*, Willd. A shortly creeping fern, in distribution Indo-malayan, in the Abor Hills very common in all kinds of forest, invariably in forest of *Vatica Shingheng*, (in Zone 3) at Balek and Janakmukh and up to 3,200 ft. or 975 m. over Renging camp (36245, 36266).

Leptochilus axillaris, Kaulf. *Acrostichum axillare*, Hook. and Baker: *Gymnopteris variabilis*, var. *axillaris*, Beddome, Ferns Brit. Ind., p. 430. ▲

short-creeping fern, in distribution Assamo-malaysian : epiphytic upon the vertical faces of tree-trunks in deep shade in the Plains (Zone 1) about Kobo (37031, 37071).

Leptochilus heteroclitus, C. Chr. *Acrostichum flagelliferum*, Hook. & Baker : *Gymnopteris flagellifera*, Beddome, Ferns Brit. Ind., p. 433. A creeping fern, in distribution Assamo-malaysian, a common "walking fern" of the high forest in the Hills (Zone 3) in the Serpo valley and up to 1,800 ft. or 549 m. close to Renging camp (36319, 38152). From November to March spore-bearing fronds are scarce. It is often associated with *Terminalia myriocarpa* but not in the pure forests.

Schizaeaceae.

Lygodium japonicum, Swartz : Beddome, Ferns Brit. Ind., p. 457. A climbing fern, in distribution Indo-burmese. It commonly fails to climb in Upper Assam where it inhabits chiefly ditches in the open, and probably from the uniformity of the forest covering was not detected in the Plains under the Abor Hills ; but in the Hills it was found growing over boulders just below the flood limit (in Zone 4) along the banks of the Dihang under Ponging, under Rotung and at the mouth of the Sireng river (37394).

Marattiaceae.

Angiopteris evecta, Hoffm. Beddome, Ferns Brit. Ind., p. 460. A big tufted fern, in distribution in Madagascar and Indo-polynesian ; in the Abor Hills (Zones 3 and 4) on the Janak and the Lalik streams.

Ophioglossaceae.

Ophioglossum vulgatum, Linn. Beddome, Ferns Brit. Ind., p. 464. A stalked fern very widely spread through the World, in the Abor Hills holding its own chiefly below flood limit on the banks of the Dihang (through Zones 3 and 4) from Janakmukh (37135) up to Yambung, chiefly among stones : and also at Renging (36611) and between Rotung and Kalek. No. 37399 was collected at the mouth of the Sireng river.

Helminthostachys zeylanica, Hook. Beddome, Ferns Brit. Ind., p. 467. A stalked fern, in distribution through the Tropics of the Old World ; in the Abor Hills found once only (in Zone 4) at 2,100 ft. or 640 m. upon a clearing south of the Libang stream in a patch of *Hedyotis hispida* (37734).

Equisetaceae.

Equisetum diffusum, Don. A small Horse-tail growing in full sun where exposed to flooding, in distribution Assamo-burmese: found (in Zone 1) in the bed of the Brahmaputra at Kobo abundantly, and (in Zones 2, 3 and 4) along the banks of the Dihang at Pasighat, Janakmukh (37157) under Ponging, under Rotung, at the mouth of the Sireng river, at Kekar Monying, at Puak, and at Yambung camp; found also more sparingly on the bank of the tributary streams as the Janak (37290), Serpo and Yambung. It appears to obtain a considerable amount of distribution down stream in the rivers because it is evident in so many cases that *Carex Thomsoni* and like plants have arrested the branches rolling over the river bed and enabled them to come to an anchorage.

Equisetum debile, Reichb. A sprawling Horse-tail, maintaining its position among bushes by means of its lateral branches, in distribution Indo-polynesian, found (in Zone 1) and in the bed of the Brahmaputra at Kobo, about Sadiya (35779), (in Zone 2) about Piling and Pasighat, (in Zone 3) at Janakmukh about upper flood limit on the bank of the Dihang. In the river beds where submerged for half the year, it was sterile.

Lycopodiaceae.

Lycopodium cernuum, Linn. An exceedingly widely spread Club-moss, found throughout the Tropics and Temperate regions of the World, found (in Zone 3) upon the undercliff below Janakmukh among *Saccharum*, and in secondary jungle above Renging camp (36834) and (in Zone 4) on a hill-top on the side of Ponging towards Jaru.

Psilotaceae.

Psilotum triquetrum, Swartz. A herb usually epiphytic, in distribution round the world in warm countries, found in the Abor Hills once only (in Zone 4) at Rotung (37595) growing in the debris accumulated by a very large plant of *Asplenium Nidus* in association with *Nephrolepis*, *Polypodium nummularifolium*, *Polygonum Posumbu* and seedings of *Maesa indica* and a *Jasminum*

Selaginellaceae.

Selaginella caulescens, Spring. A relatively large Selaginella, in distribution Indo-malaysian and in China and Japan; found (in Zone 3) at the edge

of the Hills upon rocks by a tributary of the Shile stream at 1,600 ft. or 488 m. (36583), and in a similar position by the Janak stream at 700 ft. or 213 m. (37274): (in Zone 4) in secondary jungle growing in patches nearly a metre across upon the top of a hill upon the side of Ponging towards Jaru at 2,400 ft. or 732 m. (36168), and in the shade of *Castanopsis* forest above the head of the Igar stream at 4,000 ft. or 1,219 m. (36186), and upon the hill west over Renging camp about 4,400 ft. or 1,341 m. (36291).

Selaginella atroviridis, Spring. A *Selaginella* of moderate size, in distribution Assamo-malaysian and in China; found (in Zone 4) in the gorge of the Dihang under Rotung at 700 ft. or 213 m. and upwards to the rim of the gorge at 1,300 ft. or 396 m. (37368), and in the valley of the Igar stream on rocks at 2,200 ft. or 671 m. on its west side (37349).

Selaginella picta, A. Br. A delicate *Selaginella*, in distribution Assamo-burmese; found (in Zone 4) in deep shade near Yambung camp (37697). It is a very pretty species, its small leaves white.

Selaginella Wallichii, Spring. A rather large very pretty *Selaginella*, in distribution Assamo-malaysian; found (in Zone 3) just within the Hills in a hollow close to Janakmukh and by the Shile stream and about Renging camp and from it upwards to 4,400 ft. or 1,341 m. and (in Zone 4) above Upper Renging camp at 3,200 ft. or 975 m. (36265), and from 3,200 to 3,400 ft. or 975 to 1,036 m. on the hillside above the Igar stream (36101).

Selaginella plana, Hieron. *S. canaliculata*, Baker in part. A *Selaginella* of moderate size, in distribution Assamo-malaysian: found (in Zone 2) in the forest near Pasighat (36858).

Selaginella Willdenowii, Baker. *S. laevigata* Spring. A big *Selaginella*, in distribution Assamo-malaysian and in Cochin-china; found (in Zone 1) in dense shade at Kobo (37028) not common, and (in Zone 3) on the Sipi stream and at Janakmukh in abundance, and (in Zone 4) on the clearings of Rotung and Ponging and about the neighbourhood of the Yambung stream.

Selaginella semicordata, Spring. A delicate species, occurring in India: found in (Zones 3 and 4) plentiful from 2,000 ft. or 610 m. upwards, on the water-parting between the Serpo and Igar streams at 5,100 ft. or 1,554 m. (36343) and at Ripshing Sieng at 5,500 ft. or 1,676 m., over Rotung at 2,000 ft. or 610 m. and 3,700 ft. or 1,128 m. over Pangi village (37783).

Selaginella plumosa, Baker. In distribution Indo-malaysian and west China: found (in Zone 4) in an old neglected clearing near Rotung at 1,400 ft. or 429 m. (36179).

PART IX.

**Enumeration of the Higher Plants—Siphonogama,
arranged after Hooker fil.****Ranunculaceæ.**

Clematis gouriana, Roxb. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 4. A half-woody climber, in distribution Indo-malaysian but more Indian than Malaysian, and extending into China; in the Abor Hills, in sunny places such as clearings; (*in Zone 4*) found at Ponging, Rotung (37362) up to 1,600 ft. or 488 m., Yabung (37716) and over the Libang stream at 1,800 ft. or 549 m.

Clematis sikkimensis, J. R. Drumm. in Herb. Kew. *C. acuminata*, DC., var. *sikkimensis*, Hook. f. & Thoms; Hook. f., Fl. Brit. Ind. i. 6. A half-woody climber, in distribution Assamese. It is doubtless the *Clematis* of Griffith's *Journal* i. 37-38, found by him at "Prensong's village" in the Mishmi Hills. In the Abor Hills, it was found with beautiful white bell-flowers, full of honey, (*in Zone 4*) above Rotung (36172) at 2,300 ft. or 701 m., and at 3,700 ft. or 1,128 m. also, and by Pangi village at 1,800 ft. or 549 m., as well as above Pangi village at 3,800 ft. or 1,158 m., (37781) on the edge of a clearing. It flowers in January.

Clematis sp. A half-woody climber collected (*in Zone 3*) near Renging camp (36723).

Naravelia zeylanica, DC. Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. i. 7. A rather large woody climber, in distribution Indo-malaysian. It is quite common in the upper Assam plain where it was collected (*in Zone 1*) by Griffith at Sadiya (Trans. Agri-Hort. Soc. Ind. v., 1838, 119).

Ranunculus, near *R. flaccidus*, Hook. f. & Thoms. A little half-succulent herb, rooting at the nodes of long runners, the leaves cordate and coarsely bluntly serrate, the flowers small and yellow, found (*in Zone 3*) in a pig-wallow at 5,500 ft. or 1,676 m. upon the water-parting of the Serpo and Igar streams (36204), and (*Zone 4*) in the marsh of Ripshing Sieng at the same altitude (36977), with its first flowers out in March. There are specimens in the Herbarium of the Royal Botanic Gardens, Kew, from Mt. Omei in China (Wilson 3071, and 4701) which agree very closely.

Dilleniaceæ.

Dillenia indica, Linn. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 36. A tree of moderate size, in distribution Indo-malaysian as far as Wallace's Line. It is the Somapa of the Abors; but it does not penetrate their hills further than Janakmukh. In the plains, it is very common in forest (of *Zone 1*) from Kobo to (*Zone 2*) Pilung, at Lokpur, and Pasighat, and (*Zone 3*) into the Hills at Janakmukh, dropping its big fruits in December, January and February. Just as it fails to penetrate further into the Abor Himalaya, so also it seems to fail to penetrate the Sikkim Himalaya. In Ceylon it ascends to 2,000 ft. or 610 m.

Magnoliaceæ.

Talauma Hodgsoni, Hook. f. & Thoms. Hook. f., Fl. Brit. Ind. i. 40. A tree in distribution Assamo-burmese, with an extension to Central Nepal. It is said to be a lofty tree: but under the Abor Hills it is one of second rank in the forest, in the plains (*Zone 1*) common at Kobo (35919, 35937), and again (*Zone 2*) at Pilung. From these places on the Plains it penetrates the Hills; in the Hills, it was observed (*in Zone 4*) on the "Razor-edge" ridge between the Igar and Lalik streams at 2,000 ft. or 610 m. Its fruit falls to the floor of the forest, and birds attracted by the brilliant orange colour of the seed, it appears, distribute it.

Michelia Griffithii, Finet & Gagnepain. *Magnolia Griffithii*, Hook. f. & Thoms.; Hook. f. Fl. Brit. Ind. i. 41. An endemic evergreen tree in the Plains (*Zone 1*) collected by Griffith near Sadiya. It has not been obtained elsewhere, though it may be the "Magnolia" recorded in his *Journal*, i. p. 47, found at the foot of the Mishmi Hills in descending from Deling to the Lai Pani, or that of which he got fruit (i. p. 29) at the Brahmakund.

Michelia oblonga, Wall. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 43. A tall tree in distribution Assamese, first got by a collector for Wallich to the south of the Khasia Hills, later found to extend into the hills, into the upper Assam plains, and into the Assam Himalaya: in the Plains, found (*Zone 2*) about Pilung (38128) very plentifully in the forest north of the camp, but it disappears again upon the submontane gravels toward the Abor Hills.

Michelia punduana, Hook. f. & Thoms. Hook. f. Fl. Brit. Ind. i. 43. A tall tree in distribution Assamese: in the Abor Hills at any rate from 3,500 to 5,000 ft. or 1,067 to 1,524 m., being exceedingly abundant (*in Zone 3*)

upon the south face of Bapu (36532, 36565, 36919), making a great part of the forest ; and (*in Zone 4*) it is common also towards Rotung. The Abors call it Shitorah.

Kadsura roxburghiana, Arn. Hook. f., Fl. Brit. Ind. i. 45. A woody climber in distribution Assamo-burmese, or if *K. wightiana* be reduced to it, Indo-burmese ; but on the whole *K. wightiana* seems reasonably separable. In the plains, Griffith, three quarters of a century ago, got this species (*in Zone 1*) at Sadiya, and it is the "*Uvaria heteroclita*" of his *Notulae* iv. p. 711. It was found on the Abor Expedition at Kobo (35973) with its yellow downwardly directed flowers open in the month of December, and in the Hills (*in Zone 3*) just as far as Janakmukh.

Anonaceae.

Desmos chinensis, Lour. *Unona discolor*, Vahl. ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. i. 59. A woody half-climber, in distribution Indo-malaysian, but rather irregularly so, as it is found in the Konkan and in Kanara only of western India. It seems to be not uncommon in China. In the Hills (*Zone 4*) collected at Rotung at 1,300 ft. or 396 m. in fruit (36084).

Dasymaschalon longiflorum, Finet & Gagnep. *Unona longiflora*, Roxb. ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. i. 61. A small slender tree or tall shrub, in distribution Assamo-malaysian. In the hills, sterile material indentified as this, was got (*in Zone 4*) above Rotung at 3,900 ft. or 1,189 m. (38193).

Popowia Hookeri, King in Journ. As. Soc. Bengal, lxi., 1892, p. 97 ; *Polyalthea argentea*, Hook. f. & Thoms. ; Hook. f., Fl. Brit. Ind. i. 67. A shrub in distribution Assamese ; in the plains common, in the forest (*Zone 2*) from Pasighat to the Hills and in the Hills (37129) (*Zone 3*) from Janakmukh to (*Zone 4*) the Igar valley, and beyond, over Babuk (37662). It occurred up to 3,800 ft. or 1,158 m. over Babuk, and up to 4,500 ft. or 1,372 m. over Renging camp (36342) being very common. In the forests of *Vatica Shingkeng* it is the commonest shrub of the undergrowth except Shingkeng seedlings ; it is very common also in the oak forests. Its livid pink fruits were observed in the month of January.

Oxymitra fornicata, Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 71. A woody climber, in distribution Assamo-burmese, found (*in Zone 4*) at Puak at 900 ft. or 274 m. (36025).

Melodorum bicolor, Hook. f. & Thoms. Hook f., Fl. Brit. Ind. i. 80. A woody sprawler in distribution Assamo-burmese. It has been known for some time as a plant of the plains at the head of the Brahmaputra valley : and also there is an old sheet in the Calcutta herbarium without collector's name ticketed " Abor hills." In the Hills; found as a bush (*in Zone 4*) at Rotung (37386, 36139) at 1,300 ft. or 396 m., and at Kebang (37797) at 2,000 ft. or 610 m., bearing new hanging foliage in the month of January.

Melodorum polyanthum, Hook. f. & Thoms. Hook. f., Fl. Brit. Ind. i. 81. A large woody climber or sprawler in distribution Assamo-burmese. It occurs in the plains at the top of the Brahmaputra valley, in the Hills (*in Zone 3*) at Balek (36889) at 1,800 ft. or 549 m., and (*Zone 4*) at Rotung (37628) at 1,300 ft. or 396 m., and upon the east side of the Dihang near the Libang stream (37747) at 1,500 ft. or 457 m.

Milium roxburghiana, Hook. f. & Thoms. Hook. f., Fl. Brit. Ind. i. 87. A small tree in distribution Assamo-burmese ; in the Plains plentiful as a shrub in the forests (*Zone 1*) at Kobo (37074), (*Zone 2*) Lokpur, Pilung (38203), Pasighat (36762), in the Hills (*Zone 3*) at Janakmukh (36857), and across the Dihang between Janakmukh and Aieng (37233) ; and further into the Hills it was common about Renging camp (36650, 36686, 37314), and above the camp up to 3,800 ft. or 1,158 m., where the forest commences to change in character.

D. wallichiana is to be considered but a form of this species. It was observed upon the south face of Bapu at 3,500 ft. or 1,067 m.

Milium ? A shrub about 2 m. high, found in shade, in foliage very like *M. roxburghiana*, with fruit hanging under the branches, (*in Zone 3*) near Janakmukh (37124), and (*in Zone 4*) on the spur above Upper Renging camp at 3,200 ft. or 975 m. (36267). It was in fruit in January.

Milium dollchanthera, Craib in Kew Bull. 1920, p. 108. A small endemic tree, found in the Hills (*Zone 3*) at Renging camp (36606) and (*Zone 4*) at Rotung (37593) at 1,300 ft. or 396 m. and again near the Dihang at Puak (37674) at 900 ft. or 274 m.

Menispermaceæ.

Aspidocarya uvifera, Hook. f. & Thoms. Hook. f., Fl. Brit. Ind. i. p. 95. A woody climber in distribution Assamo-burmese, and just entering southwestern China ; in the Hills (*Zone 3*) it was collected as a rather small climber at Balek (36881), and (*Zone 4*) in the Lalik valley (38168). It has dull yellow downwardly directed flowers.

Aspidocarya sp. A climber with very bright green leaves, and a stem 2.5 cm. in diameter, collected (*in Zone 4*) north of the Side river at 1,300 ft. or 396 m. (36078) : it had been collected earlier once in the Assam Himalaya (Lister 249 from the Daphla Hills) and is undescribed. The leaves are broadly ovate, 12 cm. long by 8 cm. broad, glabrous, and shortly acuminate. Male flowers were produced in January.

Tinospora Mastersii, Diels in Engl., Pflanzenwelt, iv. 94, 1910, p. 140. A woody climber in distribution Assamese, but extending to Sandoway in Arakan. Diels ten years ago describing it, cited, as one of the specimens seen, "Griffith in August, 1846," at which date Griffith was dead. Diels meant to cite August 1836, and the locality should be Sadiya (*in Zone 1*); and the plant is the "Menisperm" of Griffith's *Notulae*, iv. p. 315.

Tinospora cordifolia, Miers. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 97. A rather slender woody climber in distribution Indo-burmese; in the plains (*Zone 1*) at Kobo (36783) and in the Hills (*Zone 4*) observed upon the clearings of Rotung village.

Tinomiscium petiolare, Miers : Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 97. A woody climber in distribution Assamo-malaysian : in the plains (*Zone 1*) in forest at Kobo (37024), bearing fruit. The flat seed is embedded in a glutinous pulp, and without doubt is bird-distributed, for which purpose it is produced in the light-diffusion space of the forest far below the foliage.

Diploclisia glaucescens, Diels in Engl., Pflanzenwelt, iv. 94, 1910, 225. A cauliflorous woody climber in distribution South Indian except for this appearance in Assam in the Hills (*Zone 3*), it was collected upon the south face of Bapu above Balek (36953) at 2,000 ft. or 610 m. in flower and with young foliage in the month of March. The young foliage is purplish.

Pericampylus glaucus (Lam.) Merr. *P. incanus*, Miers; Hook. f. Fl. Brit. Ind. i. 102. A woody climber in distribution Assamo-malaysian, and very characteristic of Malaya proper : in the plains (*Zone 1*) at Kobo (36773).

Pericampylus aduncus, Miers in Ann. Nat. Hist., 3rd ser. xiv, 1864, 371 : Diels in Engl., Pflanzenwelt iv. 94, 1910, p. 220. Diels determines as this species a plant found by Gammie plentifully (*in Zone 1*) near Sadiya.

Stephania heruandifolia, Walp. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 103. A more or less herbaceous climber, in distribution through the

moister Old World tropics, including south-west China, in the plains in forest (*in Zone 1*) common from Kobo (37007) and Pobomukh, (*in Zone 2*) by Pilung and Lokpur to Pasighat and in the Hills (*Zone 3*) at Janakmukh. It produces new foliage at the end of the rains.

Stephania elegans, Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. i. 103 : Diels in Engl., Pflanzenwelt, iv. 94, 1910, 273. A woody climber in distribution Himalayo-assamese ; in the plains (*Zone 1*) got by Griffith at Sadiya in the year 1836.

Stephania glabra, Miers. Diels in Engl., Pflanzenwelt, iv. 94, 1910, p. 272. *S. rotunda*, Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind., i. p. 103, in part. A subherbaceous climber in distribution Indo-burmese, extending to north Siam : in the Plains, commonly (*Zones 1 and 2*) between Kobo and the foot of the Hills ; in the Hills, (*Zone 3*) between Janakmukh and Aieng (37222), and again upon the south face of Bapu. It is an exceptional plant in the Abor forests in that the rain is thrown off the leaves instead of spread over their surface.

Cissampelos Pareirae, Linn. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 103. A fair sized climber in distribution pan-tropic : in the Plains, recorded by Griffith (for *Zone 1*) as a plant of Sadiya, under the name of *Cissampelos convolvulaceus*. (*Notulæ*, iv. 312). In (*Zone 3*), a *Cissampelos* was observed over Rami Sambang toward the Serpo. and (*in Zone 4*) at Rotung and at Yambung camp which appeared to be this species.

Cissampelos sp. A rather large climber with rough stems, leathery leaves glaucous below and also thinly pubescent, peltately subcordate, up to 9 cm. long by 8 cm. broad, flowers produced in January on the lower part of the stems, and fruits approaching ripeness in March. It appears to be endemic. It was obtained (*in Zone 3*) between Janakmukh and Aieng (36460) and at Balek (36877), and (*in Zone 4*) between the Dihang river and Kebang at 900 to 1,500 ft. or 274 to 457 m. (37793), always in forest.

Cyclea bicristata, Diels in Engl., Pflanzenwelt, iv. 94, 1910, 317 ; *Lophophyllum bicristatum*, Griff. ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. i. 105. A woody climber in distribution Assamese, in the Hills found (*in Zone 3*) at Balek (36877).

Pycnarrhena planiflora, Wall. *P. pleniflora*, Miers ; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 106. A climber 2-35 m. high in distribution Assamo-chinese ; (*Zones 1 and 2*) common from Kobo to the foot of the hills in forest, with green flowers between Lokpur and Pasighat at the end of February (38132), and at Pasighat with flowers in March (36763).

Berberidaceæ.

Stauntonia brunoniana, Wall. *Parvattia brunoniana*, Decne. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 108. *S. elliptica*, Hemsl. in Hook. Ic. Plant. 1907, t. 2844, A woody climber, in distribution Assamo-burmese, being an outlying member of a genus best developed in China. It descends into Upper Assam and was found in high forest (*in Zone 1*) at Sadiya (35773) and at Kobo, producing its straw-coloured flowers in the shade in the month of November.

Nymphaeaceæ.

Nymphaea stellata, Willd. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 114. A water-lily distributed through the Tropics of the Old World, and common in most parts of India : in the Plains (*Zone 1*) it occurs in ditches about Sadiya.

Papaveraceæ.

Papaver somniferum, Linn. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. 117. The Opium Poppy, a plant which can be grown very widely through the Tropics as a cold weather crop, and far into the Temperate zone, when grown in the Temperate zone deficient in narcotic properties. In the Plains, under British rule its cultivation is restricted, and it is no longer grown as it was in 1836, (*in Zone 1*) about Sadiya (*vide* Griffith in *Journ. Agri.-Hort. Soc. India*, v. 1838, p. 119). But the Abors grow it under the name of Kani, a white flowered race or races. It was seen (*in Zone 2*) on the clearings of Balek village which stretch over the plain towards Lokpur (36449, 36997) and (*in Zone 4*) in the Hills about Rotung and near the mouth of the Sireng river. Doubtless it would have been seen elsewhere had the season been right, and peace existing.

Fumariaceæ.

Dicentra scandens, Walp. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 121, including *D. thalictrifolia*, Hook. f. & Thoms. A small herbaceous climber in distribution Himalayo-assamese, requiring full sun for its growth, in the Hills found only (*in Zone 3*) upon some dry ridges on the south face of Bapu (36536) at 4,600 ft. or 1,402 m. and (*Zone 4*) over Rotung at about the same height. Its season of growth had but shortly commenced when the time came for the Expedition to move out of the Hills.

Cruciferae.

Nasturtium indicum, DC. Hook. f. & T. Anders. in Hook. f. Fl. Brit. Ind. i. p. 134. A cold weather annual, in distribution Indo-malaysian, and extending through China to Japan, in the Plains (*in Zone 1*) by the bank of the Brahmaputra at Saikhowa (32634).

Cardamine hirsuta, Linn. var. *sylvatica*, (Link); Hook. f. & T. Anders. in Hook. f., Fl. Brit. Ind. i. p. 138. A weed distributed throughout the Temperate Zones of the World, and extending in many places as a cold weather annual into the Tropics. In was (*in Zone 3*) at Renging (36604), and it was common (*in Zone 4*) on the clearings of Ponging and Rotung villages, on the banks of the Sidi stream, and upon both banks of the Dihang at Yambung (37728). It flowers in January in moister spots, but upon sand at the river margin had seed all but ripe in that month.

Brassica rugosa, Prain in Bulletin No. 4 of Dept. Land-Records and Agric., Bengal, 1898, p. 11. A cold weather crop of the Himalaya and of China. It is thought that small plants obtained (*Zone 4*) on clearings at Rotung at about 1,000 ft. or 305 m. (37543) represent this vegetable.

Brassica juncea, Hook. f. & Thoms. Hook. f. & T. Anders. in Hook. f., Fl. Brit. Ind. i. p. 157. Prain in Bulletin no. 4 of Dept. Land-Records and Agric., Bengal, 1898, p. 16. The Indian Mustard, a crop widely grown between Egypt and China, common in India, found (*in Zone 4*) at 1400 ft. or 427 m. near Rotung (36135).

Brassica Napus, Linn. var. *dichotoma*, Prain in Bulletin no. 4 of the Dept. Land-Records and Agric., Bengal, 1898, p. 36. The Indian Rape a variety of the widely cultivated species which gives the European Summer Rape, Winter Rape, Sweet Navet, etc., apparently a somewhat important cold-weather crop-plant among the Abors; found (*in Zones 3 and 4*) upon the unsown clearings at Ramnidambang (36421), Rotung and Ponging.

Sisymbrium? A Crucifer found in a very young state in the swamp Ripshing Sieng at 5,500 ft. or 1,676 m. (36983 bis).

Capparidaceae.

Capparis multiflora, Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 178. A large shrub in distribution Assamo-burmese, but only just in Burma: in the Hills (*Zone 4*) it was found at Rotung (36052) with ripe fruit in January.

Capparis tenera, Dalz. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 179. A sprawling shrub, in distribution Indo-burmese, rather variable, and possibly better divided into subspecies. It was collected only (*in Zone 2*) at Pasighat (38135), with flowers in the end of February. If *C. tenera* be sub-divided, this is *C. Brandisii*, Kurz.

Roydsia suaveolens, Roxb. Griffith, Notulae, iv. p. 578 ; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 180. A large woody climber in distribution Assamese : in the Plains (*Zone 1*) found by Griffith at Sadiya.

Violaceæ.

Viola Patrinii, DC.: Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 183. A small violet distributed, in subspecies across Asia from mid-Russia to Japan and extending southwards through the mountains of the Tropics to Ceylon, Sumatra, Java and Timor. Griffith recorded it in the Plains (*Zone 1*) as a Sadiya plant (*Trans. Agri-Hort. Soc. India*, v., 1838, p. 121) and so also Gammie (*Records Bot. Survey India*, i. p. 71). It is the commonest of the violets in the Hills, occupying clearings along with *V. diffusa*, and is not absent from sandy corners along the river banks where it associates with *V. glaucescens*, but it is not in rocky places with that species on these banks, nor on rocky dry ridges with *V. distans* high up on the hills. Sometimes for a while it is the commonest of all weeds upon a clearing, but its abundance decreases with the ageing of the clearing. It was not observed upon the clearings of Balek village which are on the gravels under the hills, nor among the houses of Balek village ; but it was very plentiful (*in Zone 3*) on the Rammidambang clearing especially in its upper parts (36403) and was plentiful at Renging camp which stood at a slightly greater altitude (36613, 36693, 37323) : again (*in Zone 4*) upon the clearings of Ponging, Rotung and Babuk it was very plentiful, and on clearings over the Libang stream at 1,800 ft. or 549 m. It withstands submerging on the Dihang banks (*Zones 3 and 4*) as at Janakmukh (37144), under Rotung, and at Yambung (36022). It flowers freely in January and February.

It is believed also that a fruiting specimen from the summit of the clearings of Panji village at 3,800 ft. or 458 m. (37774) is *V. Patrinii*.

Becker (in Engl. Bot. Jahrb. LIV, 1917, Beibl. 156) declares that the Indian *V. Patrinii* should be called *V. betonicifolia*, Sm., keeping the name "*V. Patrinii*, DC." for the plant of Siberia and Japan. The distribution *V. betonicifolia* is Afghanistan to Ceylon, China and Eastern Malaysia. The view appears reasonable. The Russian plant is to him *V. macroceras*, Bunge.

Viola inconspicua, Bl. Becker in Engl. Bot. Jahrb. LIV, 1917, Beibl. no. 120, p. 171. Mr. Gammie's no. 243 from Sadiya is so determined. This little violet extends from the Sikkim Himalaya through southern China and the western part of the Malay region.

Viola distans, Wall. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 183. A herb in distribution Indo-assamese. It was found in the Abor Hills (*Zone 3*) upon a rocky ridge on the south face of Bapu (36537) at 4,000 ft. or 1,219 m., at 4,800 ft. or 1,463 m., and at 5700 ft. or 1,737 m., in the variety "*jimbriata*," Hook. f., flowering abundantly in March.

Viola glaucescens, Oudem. in Miq. Ann. Mus. Bot. Lugd. Bat. iii, p. 74. A herb, in distribution Himalayo-malaysian, occurring (*in Zone 1*), on the plains at Sadiya (Griffith, Notulae iv. p. 575), in *Zones 3 and 4* of the Hills along the Dihang banks, at upper flood limit at Janakmukh (36400) under Rotung (37372), at Kekar Monying (36042) and at Yambung (36028). In January both capsules and its lilac or white flowers could be found. The narrow keel is directed forwards horizontally.

Viola diffusa, Ging. Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 63. A little violet in distribution Assamo-chinese, in Burma only in the extreme north, extending to central Nepal. In the Abor Hills it is one of the first intruders upon clearings, and is perhaps at its commonest on them while the stubble of the grain crop is still there, and when *Ageratum* is abundant somewhat shading it. In (*Zone 3*), it was found at Renging camp (36698): and it descended to 900 ft. under Balek on the edge of the plain; (*in Zone 4*) in many places on clearings. It was found upon the bank of the river Dihang by Yambung camp at 900 ft. or 274 m., but it is rare in such places. Besides occurring on the Dihang bank at 900 ft. it was nearly as low at Ponging, Rotung (37551) and Babuk. It was collected at 3,800 ft. or 1,158 m., on the clearing of Pangî village (37773, 37774); and this is about as high as clearings occur, so that its absence higher is to be ascribed to want of opportunity. Flowers were hard to find during the months of the Expedition, but were not absent. Seeds were sent to Calcutta, and grown there during the cold weather up to flowering, when all the flowers produced were cleistogamic.

Flacourtiaceæ.

Bennettia longipes, Oliv. in Hook. Ic. Plant. xvi. 1887, t. 1596. A small tree in distribution Assamese, obtained formerly in Sylhet, and now (*in Zone 2*) at Pasighat under the Abor Hills (36753, 37446) and in the Hills (*Zone 4*) at Yambung (37715) and by a stream north of Pangî village at 1,500 ft. or 457 m. (37770).

Gynocardia odorata, Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. i. p. 195. *Chaulmoogra odorata* Roxb. A fairly large evergreen tree, furnishing a very small part of the Chaulmugra seeds of the Indian bazaars, in distribution Assamo-burmese. It occurs on the plains of Upper Assam and was described from Sadiya (*Zone 1*) by Griffith (*Notulæ*, iv. p. 611). It occurs at Kobo (33917), as a tree of moderate size at places where old cultivation or erosion has broken the depth of the forest. On Bapu over Balek (*Zone 3*) it was found at 2,300 ft. or 701 m. and over Renging camp at 2,700 ft. or 823 m., and then again (*Zone 4*) over Rotung at 3,600 ft. or 1,097 m. It was found also in the Lalik valley, on the "razor-edge" between the Lalik and the Igar, and by the mouth of the Sireng stream. The fruits hung ripe on the old wood and up the trunks to ten feet from the ground in the month of November; by March the seeds had been released.

Polygalaceæ.

Xanthophyllum Burkilli, Drummond & Dunn in Kew Bull. 1920, p. 245. An endemic tree, the most outlying species of its genus geographically, found in the Plains, (*in Zone 2*), at Pasihat (36767, 36864) and (*in Zone 3*) at Janakmukh. Early in March the lilac-flushed pendent young leaves made it conspicuous. It flowered at the same time.

Caryophyllaceæ.

Brachystemma calycinum, Don. Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. i. p. 235. A herbaceous sprawler in distribution Himalayo-burmese with its western limit in Jaunsar. In the plains under the Abor Hills it is not uncommon (*in Zone 1*) as at Kobo (35944) where cultivation has occurred formerly. In the Hills, common (*in Zones 3 and 4*) up the course of the Dihang to Yambung and the Libang stream. It was found once as high as 2,700 ft. or 823 m. this between Rotung and Kalek: otherwise its limit seems to be about 1,400 ft. or 427 m. as at Balek (36448) and Rotung (37353). It grows vigorously late in the rains and comes into flower in December, maintaining the flowering until March. The flowers are directed downwards. The Abors call it Kushreng.

Drymaria cordata, Willd. Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. i. p. 244. A small herb, in distribution pantropic but in the hills for the most part at a slight elevation. In India its limits are obviously determined by its considerable demand for moisture, and the areas which it occupies are consequently broken. The conditions at ~~the upper end of the Brahmaputra~~

valley evidently suit it well, and (*in Zone 1*) in the Plains it is not uncommon. Griffith got it at Sadiya (Trans. Agri.-Hort. Soc. India, v. 1838, p. 123), where also, I have seen it. It was newly in flower at Kobo on March 11th, 1912. In the Hills as a weed on clearings and still more so in little openings in the forest it is common as for instance (*in Zone 3*) through the big village of Balek, on its clearings, on the clearings near Renging camp, (*Zone 4*) at Rotung, Ponging, Kalek, Babuk, Kebang, Yambung and Pangi. Its greatest height was 3,000 ft. or 914 m. over Renging camp.

Portulacaceæ.

Portulaca oleracea, Linn. Dyer in Hook. f., Fl. Brit. Ind. i. p. 246. A small herb occurring as a weed in all warm climates; in the Plains, (*Zone 1*) found on the bank of the Brahmaputra at Pobamukh (38230), flowering in March, at levels which are covered by flood-waters in the Rains.

Hypericaceæ.

Hypericum nepaulense, Choisy. Dyer in Hook. f., Fl. Brit. Ind. i. p. 256. A small prostrate herb in distribution Indo-burmese. In the Hills (*in Zone 4*) it is not uncommon in the marsh of Ripshing Sieng at 5,500 ft. or 1,676 m. (36985), and was flowerless when found in March.

Hypericum japonicum, Thunb. Dyer in Hook. f., Fl. Brit. Ind. i. p. 256. A small annual of moist places, in distribution Indo-australian, and extending to Japan: in the Plains, it was found abundantly (*in Zone 1*) at Sadiya flowering in August (32645).

Guttiferæ.

Garcinia pedunculata, Roxb. T. Anderson in Hook. f., Fl. Brit. Ind. i. p. 264. A tree of moderate size, in distribution Assamese, and cultivated for its fruit. Besides specimens from Assam and Upper Burma, there exists one, thought to have been collected from a wild tree which came from Mergui. In Aborland it was found (*in Zone 4*) near the Dihang close to Yambung camp, sterile.

Garcinia morella, Desrouss. T. Anders. in Hook. f., Fl. Brit. Ind. i. p. 264. A small tree, in distribution Indo-malaysian: found (*in Zone 2*) at Pasighat, and (*in Zone 3*) at Rammidambang (37498).

Garcinia stipulata. T. Anders. in Hook. f., Fl. Brit. Ind. i. p. 267. A medium-sized or rather large tree in distribution Assamese, confined to the lower Eastern Himalaya unless it be that it occurs also in the North Cachar Hills. In Sikkim it ascends to 7,500 ft. or 2,286 m. It is a common tree in the Abor Hills, and very noticeable in season by the red colour of the pair of new leaves terminating the branches. In the Hills, it was found (*in Zone 3*) from 3,500 ft. or 1,067 m. to 4,800 ft. or 1,463 m. upon the south face of Bapu abundantly and in the neighbourhood of Renging camp from 1,300 ft. or 396 m. to 5,500 ft. or 1,676 m. It was particularly abundant (*in Zone 4*) near the Dihang river at Yambung and below upon both banks towards Sissin village and to the mouth of the Side river (36124), about Rotung village (38198), and in the Oak forest upon the waterparting between the Serpo and the Igar (36183, 36209). On Bapu the diameter of the stem at breast-height rarely exceeded 8 inches. Fruits were found in January, along with the much protracted production of new foliage.

Calophyllum polyanthum, Wall. T. Anders. in Hook. f., Fl. Brit. Ind. i. p. 274. A big evergreen tree, yielding a good timber, in distribution Assamoburmese, extending to Tenasserim. It was collected, in leaf only, in the Abor Hills (*Zone 3*) close to Renging camp at 2,000 ft. or 610 m. (36839) and (*Zone 4*) above Rotung at 4,500 ft. or 1,372 m. (38199). The material being sterile, there is some small doubt in the accuracy of the determination.

Mesua ferrea, Linn. T. Anders. in Hook. f., Fl. Brit. Ind. i. p. 277. A tree of medium size, but considerable value, and reserved in the plains of Assam, — the source of not a little revenue. In distribution it is Indo-malaysian; but does not overpass Singapore. It ascends the eastern Himalaya to 6,000 ft. or 1,829 m. It is plentiful in the Plains in forest under the Abor Hills (*in Zone 2*) upon the pleistocene gravels, *i.e.*, in the Terminalia forest from Lokpur to the northward; in the Hills it is at Janakmukh (36504) (*in Zone 3*). It is present in mixed forest to the north of Janakmukh and also in forest of *Vatica Shingken* northwards to the Serpo valley and towards Aieng. These forests in March were much beautified by its new red foliage. The Abors call it Inji and Nang-er, which latter name appears to be meant for the Assamese name Nahor.

Ternstroemiaceæ.

Adinandra, sp. A small bush, either a new species of *Adinandra* or a *Pyrenaria*, (*in Zone 4*) found below upper flood limit on the side of the Dihang under Ponging village (36143) at 600 ft. or 183 m.; in fruit, with new foliage and flower buds just appearing in January.

Eurya symplocina, (Blume?). Dyer in Hook. f., Fl. Brit. Ind. i. p. 284. A slender shrub, in distribution Eastern Himalayan, extending from Central Nepal to the Mishmi Hills, and doubtfully in Java. In (*Zone 3*), it was found upon the summit of Bapu at 6,266 ft. or 1,910 m. (36944).

Eurya acuminata, DC. Dyer in Hook. f., Fl. Brit. Ind. i. p. 285, var. **Euprista**, Korthals. A shrub or small tree in distribution Indo-malaysian, montane and commonest in the cloud-belt zone of the Himalaya or other mountains. In the Abor Hills it owes its position very often to man, occurring in clearings and in places where the forest has suffered some interference or is naturally interrupted between 1,500 ft. and 4,000 ft. or 457 and 1,219 m. It occurs (*in Zone 3*) about the big Balek village, where it is called Ab-bu and (*in Zone 4*) on the clearings of Ponging (36165), Rotung, Kebang (37796) and Pangì (37787). Locally about Kebang at 2,000 to 2,100 ft. or 610 to 640 m. it was very common: in such places it associates with *Saccharum*. The branches of well grown shrubs droop slightly.

Eurya phyllanthoides, Blume. *E. japonica*, Thunb., var. *phyllanthoides*, Dyer in Hook. f., Fl. Brit. Ind. i. p. 284. A small bush in distribution Assamo-malaysian, found with dull purple berries (*in Zone 3*) at 5,100 ft. or 1,554 m. upon the waterparting between the Serpo and Lalik streams on a "razor-edge" ridge (36348, 36356) in January.

Actinidia callosa, Lindl. Dyer in Hook. f., Fl. Brit. Ind. i. p. 286. A large climber with an edible fruit, in distribution Himalayo-malaysian, and extending to Japan. It is a species which can reasonably be broken up into sub-species. It occurs in the plain at the upper end of Assam, and in the Abor Hills (*Zone 4*) was found climbing over small trees at 3,600 ft. or 1,097 m. above the head of the Igar stream (36176). The fruit hangs under the branches.

Saurauja nepaulensis, DC. Dyer in Hook. f., Fl. Brit. Ind. i. p. 286. A small tree or large shrub with an edible fruit, in distribution Himalayo-burmese. It occurs in the Abor Hills (*in Zone 3*) along the banks of the river Dihang, below Janakmukh (37487), at the mouths of the Sipi and Janak streams (37284): (*in Zone 4*) on the edges of openings in the forest or on old clearings, e.g., at Ponging and Babuk as well as by the Sili stream and from under Sissin to Yambung.

Saurauja Roxburghii, Wall. Dyer in Hook. f., Fl. Brit. Ind. i. p. 287. A medium-sized evergreen tree with an edible fruit, in distribution Assamo-burmese. In the upper Brahmaputra valley it descends to the plains. It

was found within the Abor Hills (*Zone 4*) between Rotung and Kalek at 3,300 ft. or 1,006 m. (37576) and further east above Upper Rotung camp at 2,500 ft. or 762 m. and at 4,700 ft. or 1,433 m. The flowers are produced mostly below the leaves and are open at the end of December.

Saurauja punduana, Wall. Dyer in Hook. f., Fl. Brit. Ind. i. p. 287. A small tree, in distribution Assamo-burmese. At the top of the Brahmaputra valley it descends to the plain. In the Abor Hills it is very characteristic of the clearings at a certain stage of their return to forest: it even makes a vegetative formation—the *Saurauja* jungle—which was observed to cover a part of the Signal Hill over Yambung camp, and was seen in smaller patches elsewhere. It was impossible, unfortunately, at the time of the Expedition to follow the *Saurauja* jungle back to its origin, that is to say to find out why one clearing would pass into it while another passed into a formation in which *Macaranga* or some other plant ruled. Wherever *Saurauja punduana* was found, *Ficus Cunia* was with it. Both were together (*in Zone 3*) along the Dihang banks, at Janakmukh (37159). It was found in the Balek village, and in the clearings of that village towards Janakmukh, over Rammidambang, over and below the Renging camp very plentifully (36713). In (*Zone 4*) this species and *Ficus Cunia* were together at the mouth of the Yamne river, under Rotung, at Kekar Monying, Puak and Yambung. It occurs round about Rotung and from it almost all the way to the ridge over the Igar stream at 3,600 ft. or 1,097 m. (36179), near Puak at 1,000 ft. or 305 m. (36032) very commonly, over Yambung towards Kebang at 2,100 ft. or 640 m. and on "Signal Hill," and over Pangi village up to 3,800 ft. or 1,159 m. It flowers in December.

Schima Noronhac, Reinw. ex Blume. *S. Wallichii*, Choisy; Dyer in Hook. f., Fl. Brit. Ind. i. p. 289. A rather tall tree, in distribution Assamo-malaysian, furnishing a fairly hard timber, and reserved in Assam on account of it. It is a very characteristic tree of the area which it occupies. In the Abor Hills it seems somewhat restricted, and was observed only (*in Zone 3*) about Balek village from 1,650 ft. to 2,200 ft. or 503 to 671 m.; but there abundant. The Abors call it Rabak.

Pyrenaria barringtoniaefolia, Seem. Dyer in Hook. f., Fl. Brit. Ind. i. p. 290. A scrambling shrub, in distribution Assamese. At the head of the Brahmaputra valley it descends to the plain. In the Abor Hills it was found (*in Zone 3*) at Balek (36440) and at Renging camp (36665, 36743) and (*in Zone 4*) over the Igar stream at 2,700 ft. or 823 m. again by the Dihang river near Rotung at 800 ft. or 244 m. (37503) near the mouth of the Sireng, near Kebang and at 1,200 ft. or 366 m. on the Libang stream. Its greenish fruits were ripe in January. The Abors call it Gunbang.

Camellia drupifera, Lour. Dyer in Hook. f., Fl. Brit. Ind. i. p. 293. A large shrub or small tree, in distribution Assamo-burmese, with its known limits to the west in Central Nepal, or to the east on Nattoung at the southern end of the Shan plateau. It was found by Captain F. G. T. Oakes (*in Zone 3*) upon the east side of the Dihang opposite Janakmukh, and he learned that the Abors who apparently have no true tea in their country, nor have had, use it for tea. True tea, from *Camellia theifera*, was in use by the people of Sadiya in 1836 when Griffith was there, and was got from the southwards; for, either they had worked out their nearer supplies, or the range of the tea plant had not extended to Sadiya.

Camellia lutescens, Dyer in Hook. f., Fl. Brit. Ind. i. p. 293. A small tree, in distribution Assamo-burmese but at the same time over a very restricted range, *i.e.*, the Daffla, Abor and Mishmi Hills, and the extreme north of Burma. It was found (*in Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36945).

Dipterocarpaceæ.

Dipterocarpus pilosus, Roxb. Dyer in Hook. f., Fl. Brit. Ind. i. p. 296. A giant tree, yielding a commercial resin, and timber but of only moderate value, reserved in upper Assam, where it is called Hollong; in distribution it is irregularly Assamo-burmese, and almost Assamo-malaysian. Isolated trees of it occur on the submontane gravels (*in Zone 2*) at Pilung and Lokpur. One felled was measured and found to be 140 ft. or 42.5 m. high, with a clean trunk 80 ft. or 24 m. to the lowest branch.

Vatica Shingkeng, Dunn in Kew Bull., 1920, p. 108. A tree of moderate size, endemic. It makes a most characteristic vegetative formation upon part of the pleistocene gravels at the foot of the Abor Hills, and on soils over Gondwana and Siwalik strata, and this chiefly upon hill-slopes which face north. It was first met with (*in Zone 2*) north of Pasighat in two or three places up to Janakmukh (37453) (*in Zone 3*) over small areas; then over a large area between Janakmukh and the Rammidambang clearing as a pure forest and again above the clearing (37311); northwards again it covered steep slopes in the Serpo valley, and all about the Renging camp (36257) making fully sixty per cent. of the trees on some areas, but displaced on sunny slopes by *Terminalia myriocarpa* and others. Northwards over the Abor volcanic rocks it seemed to disappear. East of Janakmukh it extends at any rate to Aieng, and westward at any rate to Balek. Above Balek on the lower slopes of Bapu it rules in places, and the photograph reproduced on plate IV was taken there. In *Zone 4* over the mouth of the Yamne river and on the

edge of the Lalik valley there are sporadic trees. The Abors call the tree Shingkeng; the prefix "shing" which occurs whole or abbreviated in so many of the vernacular names quoted here, means tree.

There are two types of Shingkeng forest, one found on stony ground in which the undergrowth is scanty, and the light-diffusion space in consequence extended from ten feet almost to the soil, the other that which is not upon stony ground where Shingkeng seedlings and shrubs are so numerous that there may be no light-diffusion space at all. The shrubs and shade herbs found in the Shingkeng forest in such places include *Polyalthia argentea*, *Guatteria pallida*, *Diospyros* Sp. (37246), *Ardisia* sp. (36292), *Codonacanthus pauciflorus*, *Peliosanthes violacea*, *Polypodium homionitideum*, and *Acrostichum appendiculatum*, together with lesser quantities of *Psychotria calocarpa*, and *P. denticulata*. In the plains *Millettia pulchra* is intermixed.

In this second type of Shingkeng forest the *Vatica* trees have a great tendency to fork or branch low down, as if the leader had failed; and very often their trunks from close to the base are covered with weak twigs.

There is a parallel between these Shingkeng forests and the forests of *Terminalia myriocarpa*, in that the surface soil appears little retentive of moisture, and the mortality of seedlings perhaps considerable.

Shingkeng grows to about 60 ft. or 18 m. in height, and at the base may have small stilt roots.

No general flowering took place during the Expedition, and it was with the greatest difficulty that one flowering tree was found.

Malvaceæ.

Sida rhombifolia, Linn. Mast. in Hook. f., Fl. Brit. Ind. i. p. 323. A half-woody weed, pantropic in distribution. It is common (*in Zone 1*) all about the grazing lands at Sadiya, and was found in some quantity within the hills (*in Zone 4*) upon the clearings of Rotung village (37348, 37356) between 1,000 and 1,600 ft. or 305 and 488 m. and on those of Ponging.

Urena lobata, Linn. Mast. in Hook. f., Fl. Brit. Ind. i. p. 329. A half-woody weed, in distribution pantropic. About Sadiya (*Zone 1*) it is an extremely common plant. In the Hills it was found about upper flood limits among the rocks of the Dihang bank (*in Zone 4*) under Ponging, at the mouth of the Sireng river, and at Yambung. It was found also upon the sides of paths among the clearings of Ponging village, and at the top of the Yambung gorge. It flowers in the Rains, and varies to white and rose-pink (32616) at Sadiya: in December and January few flowers are left, and all the plants are in fruit.

Hibiscus fragrans, Roxb. Mast. in Hook. f., Fl. Brit. Ind. i. p. 337. A sprawling shrub, in distribution Assamese, ascending the Sikkim Himalaya from 1,000 to 4,500 ft. or 305 to 1,372 m., but in Upper Assam down on the plains. It was found (*Zone 1*) at Kobo upon the edges of openings in the forest (35947, 37097), and (*Zone 3*) at Janakmukh, attaining a height of 18 ft. or 4.5 m. The flowers open during the night and are pleasantly scented in the early morning, but not later: they are downwardly directed, and some were found female by imperfection of the anthers. The flowering occurs in November and December.

Hibiscus vitifolius, Linn. Mast. in Hook. f., Fl. Brit. Ind. i. p. 338. A coarse herb, in distribution Indo-malaysian, found (*in Zone 1*) at Sadiya among bushes.

Hibiscus Abelmoschus, Linn. Mast. in Hook. f., Fl., Brit. Ind. i. p. 342. A coarse herb, in distribution more or less pantropic, partly by cultivation, frequent in India. It occurs (*in Zone 1*) at Sadiya (32689), flowering in the Rains.

Gossypium arboreum, Linn. Watt, Wild and cultivated cotton plants of the World, 1907, p. 81. An eastern cotton and very old in cultivation, by no means uncommon as a crop in India, cultivated (*in Zone 3*) by the Abors of Aieng (37220).

Gossypium arboreum, Linn., var. *neglectum*, Watt, Wild and cultivated cotton plants of the World, 1907, p. 95. An eastern cotton, cultivated much more in north-eastern India than elsewhere, and perhaps of Indian origin. It is the cotton chiefly found among the Abor crops (*Zones 2, 3 and 4*) up to a height of 1,500 ft. or 457 m. (Balek, 36444: Rotung, 37546). The lint is but 1 cm. long. The cotton-plant is called by the Abors Shi-pak, Shi-piak and Shi-piang.

Kydia calycina, Roxb. Mast. in Hook. f., Fl. Brit. Ind. i. p. 348. A tree of fair size, deciduous and bare for two to three months in Upper India, and probably for a month or less in Upper Assam, in distribution Indo-burmese. It occurs in the plain in the top of the Brahmaputra valley as one of the big trees of the forest, but its abundance is increased by the clearings of man, in which it springs up freely. It is common (*in Zone 1*) in the forest at Kobo (35975), and particularly so along the edge of the Kemi chapri. In *Zone 2* close to the Dihang banks it is frequent, at the mouth of the Sipi stream. In *Zone 3* it is on the Dihang bank at Janakmukh, and upon the outer face of the Abor Hills above Balek where it ascends to 3,000 ft. or 914 m. In *Zone 4* over Rotung it was found at 3,600 ft. or 1,097 m., over Kalek at 3,800 ft. or

1,158 m. and over Pangi at 3,800 ft. or 1,158 m. and at Yambung by the river; in such places *Duabanga sonneratioides* is a regular associate. March is the month when it goes bare. The Abors call it Tu-duk.

Bombax malabaricum, DC. Mast. in Hook. f., Fl. Brit. Ind. i. p. 349. A very big deciduous tree which yields forest revenue in Assam, in distribution Indo-malaysian, and extending across China. It is common in *Zone 1* at Sadiya, and very common in some parts of the plains forest in *Zone 2* under the Abor Hills as at Pasighat (36746): but in the Hills it is quite rare. A few trees were seen in *Zone 3* in Balek village, one in *Zone 4* by the water supply of Rotung village, one over the mouth of the Yamne river, and one on a col west of Ponging in the direction of Rotung at a height of 2,000 ft. or 610 m.

In the plains its occurrence is largely dependent upon changes in the courses of rivers for it is the first tree to colonise new sandbanks. From this cause it lines the edge of the Kemi and Pilung chapris. It is frequent along the side of the Dihang from Pasighat downwards to the Brahmaputra and along the Brahmaputra past Kobo and Pobamukh: but above Pasighat just under the Hills it is sporadic. In old forest the trees stand in groups of a size suggesting the former extent of the sandbank which first gave them growing space. But the centre of an open sandbank is too scorched and too exposed to firing for *Bombax* trees to take possession of the whole straight-away; instead they possess themselves of the margin and extend thence inwards. Other types of trees follow and the *Bombax* in time finds itself unable to regenerate under their shade, and so dies out. Long-undisturbed forest thus contains only old trees or none: but so long as they are present they hold their place in the sun, and conspicuous bare branches in little patches may at the right season be picked out easily if the forest be looked down on from some slight elevation.

The trees go bare in December, and stand bare for four months. The first flowers appear early in February, and flowering continues through March, but ends earlier upon the chapris than on old trees in old forest. The lowest branches of old trees may be 80 ft. or 24 m. from the ground.

The Abors call the tree Shing-gi or Shing-gie.

Sterculiaceæ.

Sterculia urens, Roxb. Mast. in Hook. f., Fl. Brit. Ind. i. p. 355. A big deciduous tree, in distribution Indian, abundant (*in Zone 1*) in the Kobo forest, and (*in Zone 2*) lining the edge of the Pilung chapri, as well as in part the river at Pasighat: but apparently absent from the high forest on the pleistocene gravels north of Pilung.

It went bare at the end of the year and flowered two months later.

Stereulia villosa, Roxb. Mast. in Hook. f., Fl. Brit. Ind. i. p. 355. A moderately large deciduous tree, giving so good a fibre as in some places to be destroyed for it, in distribution Indo-burmese, and upon the plains of northern India as much as in the hills. It was collected (in *Zone 1*) at Kobo (36795). Lorraine says that the Abors call it Shargok.

Stereulia coccinea, Roxb. Mast. in Hook. f., Fl. Brit. Ind. i, p. 357. A small evergreen tree, in distribution Assamo-malaysian. It was found in the Abor Hills in *Zone 3* at Balek (36878), and (in *Zone 4*) at Yambung (36008). The Abors call it Angom baiom.

Stereulia sp. near *S. coccinea*, Roxb. Found (in *Zone 2*) as a shrub 2-3 m. high at Pasighat (38138) with downwardly directed flowers on a plane lower than the leaves, produced in March. The leaves are broadly elliptic, and acuminate.

Echinocarpus stereuliaceus, Benth.: Mast. in Hook. f., Fl. Brit. Ind. i. p. 360. A large tree, in distribution Assamo-burmese. It occurs in the plain of Upper Assam. Gammie recorded it as growing (in *Zone 1*) at Sadiya (*Records Bot. Survey India*, i. p. 71) : and to it I assign fruits obtained (in *Zone 2*) at Pilung (38134) which exactly match fruits obtained in the Mishmi Hills by Griffith.

Echinocarpus sp. The fruits of an *Echinocarpus* (36227) were picked up from off the ground (in *Zone 4*) in oak forest at 4,000 ft. or 1,219 m. over the head of the Igar stream, which cannot be matched ; they have a diameter of 2.5 cm., and are covered with fine stiff bristles.

Heritiera macrophylla, Wall. Brandis, Ind. Trees, p. 86. A big tree, in distribution Assamo-burmese, growing with a clean stem and horizontal branches, (in *Zone 2*) commonly in the forest at Pasighat (36865, 36868) and (in *Zone 3*) at Janakmukh (36470), in the Serpo valley (36378), and from thence to above Renging camp (36264), as well as on the waterparting between the Serpo and Lalik valleys (36371) reaching 2,800 ft. or 853 m. It is conspicuous in March when its new bronzed leaves expand. The Abors call it Te-pop.

Pterospermum acerifolium, Willd. Mast. in Hook. f., Fl. Brit. Ind. i. p. 368. A big evergreen tree, in distribution Himalayo-burmese, but able to hold its own upon the plains of the north of Bengal. It is a common tree (in *Zone 1*) in the plain from Kobo (37065) to (*Zone 2*) Pilung, Lokpur, and Pasighat. In the Abor Hills it is common at slight elevations as (in *Zone 3*) at Janakmukh (37254), and (in *Zone 4*) near the course of the Dihang river to Yambung, not ascending above 1,200 ft. or 366 m. In March it goes bare.

Lorraine has the name Gang-go for a *Pterospermum* but I am uncertain if it denotes this species.

Pterospermum sp. near *P. lanceæfolium*, Roxb. A tree found, but sterile only, in the Plains forest (*Zone 2*) about Pasighat and Lokpur, and (in *Zone 3*), in the Hills plentiful in the Serpo valley near Renging camp (36838), and (in *Zone 4*) towards the Lalik valley. It changed its foliage earlier than *P. acerifolium*, and was in full new leaf at the end of February.

Abroma fastuosa, Jacq. *A. augusta*, Linn. Mast. in Hook. f., Fl. Brit. Ind. i. p. 375. A small tree or bush, sometimes regarded as no native of India, but there is insufficient reason why it should not be considered as naturally of Himalayo-malaysian distribution. It is plentiful in Upper Assam, and (in *Zone 1*) is easily found about Sadiya whence sparingly it extends through (*Zone 2*) into the Abor Hills (in *Zones 3 and 4*), taking advantage of clearings, and persisting on them as they pass into jungle upon their way to forest but not at greater elevations than 1,000 ft. or 305 m.

Buettneria aspera, Colebr. Mast. in Hook. f., Fl. Brit. Ind. i. p. 377. A big woody climber, often with a tree-like stem, or more tree than climber, in distribution Assamo-burmese, and with an extension beyond the Bengal plain in the Chota-Nagpur plateau. It is a common climber (in *Zone 2*) in the high forest of the plain under the Abor Hills upon the pleistocene gravels at Lokpur and thence to Pasighat, and (*Zones 3 and 4*) into the Hills to Yambung (36004) and Pangî. It was found at Rotung (37596) and over Renging camp to 2,800 ft. or 853 m.

Tiliaceæ.

Grewia serrulata, DC. *G. sepiaria*, Roxb. Hort. Beng. p. 42. A shrub, in distribution northern Indian, growing (in *Zone 1*) to a height to 1.25 m. at Sadiya (32677), and at Kobo (35951, 37406) upon the margin of the Brahmaputra and not above flood limit; then along the margin of the Dihang (in *Zones 3 and 4*) up from Janakmukh to Yambung abundantly, in association at times with *Ficus pyriformis*. and again on the border of the Janak stream. At Sadiya it was in flower in August, and at Kobo as well as along the banks of the Dihang in December, its flowers facing upwards.

Grewia nana, Wall. Cat. No. 1102. A very interesting little plant one of the several which grow in grass-lands in India periodically burned, and surviving with a subterranean trunk, and annually damaged branches; in distribution northern Indian, found (in *Zone 1*) upon the Kemi chapri (38115), but absent from the Pilung chapri which is not fired regularly. It flowered in March.

Triumfetta bartramia, Linn. *T. rhomboidea*, Jacq. Mast. in Hook. f., Fl. Brit. Ind. i. p. 395. A half-woody weed distributed through the Old World Tropics. It was observed (in *Zone 4*), on the clearings of Rotung, Babul, and Yambung.

Triumfetta cana, Blume Mast. in Hook. f., Fl. Brit. Ind. i. p. 396. A small shrub, in distribution Assamo-burmese. It occurs as a weed three feet high in clearings (in *Zone 1*) near Sadiya and at Pobamukh in great abundance, and within the Hills (in *Zone 4*) on the clearings of Rotung (37535) and Babuk, but only at levels up to 1,000 ft. or 305 m.

Corchorus capsularis, Linn. : Mast. in Hook. f., Fl. Brit. Ind. i. p. 397 : Burkill & Finlow in Agric. Ledger, 1907, p. 104. When wild or in those varieties which are cultivated for eating, this is a herb less than 1 m. high, but in the varieties grown for fibre it is 2-3 m. high. Wild it may be classed as in distribution Indo-burmese. It is grown for use as a vegetable in Upper Assam, and though not very plentiful, can easily be found in *Zone 1* about Sadiya, where it may run wild. The Abors use it also under the name O-leg.

Corchorus acutangulus, Lamk. Mast. in Hook. f., Fl. Brit. Ind. i. p. 398. A herbaceous short-lived weed, in distribution Indo-malaysian, and extending through China. It was observed in *Zone 4* upon the clearings of Ponging village, in January quite dead, being a Rains weed.

Elaeocarpus sikkimensis, Mast. in Hook. f., Fl. Brit. Ind. i. p. 402. An evergreen tree, in distribution Assamese, from Sikkim through the Aka Hills to the Abor Hills and in the Garo Hills : but Prof. W. G. Craib has expressed the opinion that the Sikkim plant may be separated from the plant of Upper Assam. It occurs as a small tree about 7 m. high, frequently raised on short stilt-roots, in some abundance (in *Zone 1*) about Kobo (36784, 38108), (*Zone 2*) Lokpur, and (*Zone 3*) on into the Hills between Balek and Janakmukh at about 1,000 ft. or 305 m. above sea level (36512), then again near Renging camp in forest of *Vatica* at about 1,800 ft. or 549 m. The old leaves turn red in February and the honied white flowers come out in March.

Elaeocarpus braceanus, Watt ex C. B. Clarke in Journ. Linn. Soc. Bot. xxv, 1889, p. 8. An evergreen tree, in distribution Assamo-burmese, found (in *Zone 3*) upon the summit of Bapu at 6,288 ft. or 1,910 m. (36934).

Elaeocarpus varunua, Ham. Mast. in Hook. f., Fl. Brit. Ind. i. p. 407. An evergreen tree, in distribution Himalayo-burmese, through Burma reaching Tenasserim. It was collected in *Zone 3* at Renging camp only (36738).

Linaceæ.

Linum usitatissimum, Linn. Hook. f., Fl. Brit. Ind. i. p. 410. The Flax or Linseed plant, a crop of the temperate zones, but a cold weather crop also within the Tropics, brought into the Abor Hills by accident along with grain, and growing when the Expedition left the Hills, (in *Zones 1, 2 and 3*) in the camps of Kobo, Pasighat and Renging, having flowered in February. It is unlikely that it persists.

Malpighiaceæ.

Hiptage Madablota, Gaertn. Hook. f., Fl. Brit. Ind. i. p. 418. A big woody climber, acquiring with age a trunk as thick as 9 in. or 23 cm., in distribution Indo-malaysian and through China. It grows (in *Zones 1 and 2*) in fairly high forest attaining to the sun in the plain north of the Kemi chapri (38220) and at Pasighat (36756), flowering in March.

Aspidopterys roxburghiana, A. Juss. Hook. f., Fl. Brit. Ind. i. p. 420. A woody climber, in distribution Assamo-burmese, found in positions on the edge of forest where it can get light, such as (in *Zone 1*) the river bank at Kobo (35977), and (in *Zone 4*) scrub at Rotung (37549). It was in fruit in December.

Geraniaceæ.

Oxalis corniculata, Linn. Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. i. p. 436. Calder in Records Bot. Survey India, vi, 1919, p. 340. *O. repens*, Thunb. A herb of very wide distribution through the world, both in the Temperate regions and in the Tropics. It is quick to take advantage of clearings, and is permanently established (in *Zone 1*) on the river banks at Upper flood limit, where there is shingle, but also along the sandy bank of the Brahmaputra between Kobo and Pobamukh. It invaded the clearing of Kobo camp very quickly. On the clearings in the hills (*Zones 3 and 4*) it occurred up to 2,000 ft. or 610 m. and was particularly abundant following crops of *Eleusine coracana*. The Abors call it Ag-yup.

Averrhoa Carambola, Linn. Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. i. p. 439. A fruit tree of small size cultivated widely in India, Burma and Malaya, (in *Zone 1*) observed at Sadiya.

Impatiens violacea, Hook. f., Fl. Brit. Ind. i. p. 457. A herb, in distribution Assamo-burmese, but not normally so. It was obtained (in *Zone 4*)

as a weed 15 cm. high upon the clearings of Ponging, Rotung (37350), Babuk, and Kebang, and again upon a path-side near Rotung; it grows in damp places and at Ponging at the altitude of 700 ft. or 213 m. in a small swamp extended in a sheet after the manner of Watercross. It attained 2,700 ft. or 823 m. above Rotung. The flower is a light magenta with at times a greenish tint and the spur is straight. It flowered in December and January.

Impatiens arguta, Hook. f. & Thoms. Hook. f., Fl. Brit. Ind. i. p. 470. A herb, in distribution Assamese, found (in *Zone 4*) on clearings or about their edges above Rotung at 1,600 ft. or 488 m. at Kalek commonly between 3,000 and 3,600 ft. or 914 and 1,097 m. (37557), and at the top of Pangli clearings (37776) at 3,800 ft. or 1,158 m., flowering in December and January. The flowers are lilac-purple with two orange crests within the throat, and the spur is twisted to one side.

Impatiens laevigata, Wall. Hook. f., Fl. Brit. Ind. i. p. 473. A herb, in distribution Assamese, found (in *Zone 3*) just within the Hills at Balek (36429) and on the Sijun stream north of Janakmukh. It flowers in March. The large obovate acuminate leaves grow to a size of 22 by 9 cm.

***Impatiens* sp.** near *I. laevigata*, Wall., but probably a new species; found in the Plains (*Zone 2*) between Lokpur and Pasighat (38133) as a herb with a soft somewhat diaphanous stem, about 45 cm. high, very sparsely pubescent, carrying long elliptic leaves tapering acuminate to both ends, and white flowers in the throat of which there is an orange patch upon each side of the lower middle line. It was in flower in March newly.

Impatiens tripetala, Roxb. Hook. f., Fl. Brit. Ind. i. p. 470. A common herb along the foot of the Eastern Himalaya, in distribution Assamese; observed to be plentiful (in *Zone 1*) at Sadiya in August, at which place Griffith got it in June 1836 (*Notulae* i. p. 186), and collected also at Kobo (35969, 36794), where it flowered in December and again in March.

Impatiens bracteolata, Hook. f. in Records Bot. Survey IV, 1904, p. 31. A small herb, in distribution Assamese, found in the plain near Pilung, and in the Hills not uncommon (in *Zone 4*) about the Rotung clearings to 2,000 ft. or 610 m. (36134, 37584), under Kebang (37696), in the gorge of the Yambung stream (37759) and upon the edge of the Pangli clearings at about 2,000 ft. or 610 m. It flowers in December and January, and has very asymmetric yellow flowers.

Impatiens racemosa, DC. Hook. f., Fl. Brit. Ind. i. p. 499. A tall herb, in distribution Himalayo-assamese; attaining 2 m. in height, found (in *Zone*

4) upon the crest of the hill immediately south of Rotung at 3,600 ft. or 1,097 m. (36233), in fruit in January. In the want of flowers there is a shadow of doubt on the determination.

Rutaceae.

Evodia fraxinifolia, Hook. f., Fl. Brit. Ind. i, p. 490. A small tree in distribution Assamo-burmese, extending west to Central Nepal, found (in *Zone 4*) upon the bank of the Dihang at Kekar Monying at 800 ft. or 244 m. (36041) and again over Rotung at 3,700 ft. or 1,128 m. In fruit, its black seeds set off by the red fruit-wall, are most conspicuous.

Zanthoxylon acanthopodium, D C. Hook. f., Fl. Brit. Ind. i, p. 493. A shrub or small tree, in distribution Himalayo-burmese, ascending in Sikkim to 7,500 ft. or 2,286 m. In the Abor Hills it was found only (in *Zone 4*) in the neighbourhood of Yambung, but was there common, growing 2.5 m. high in thickets by the river Dihang (37698) among planted trees of *Artocarpus*, south of the Yambung stream and across it northwards on the lower slopes of "Signal Hill" as well as across the Dihang on clearings over the Libang stream at 1,800 ft. or 529 m.

Zanthoxylon hamiltonianum, Wall. Hook. f., Fl. Brit. Ind. i, p. 494. A large scrambling shrub, in distribution Assamo-burmese, found by Griffith (in *Zone 1*) at Sadiya (*Fl. Brit. Ind.*, l. c.) and occurring (in *Zone 4*) in deep shade in the gorge of the Dihang under Rotung at 1,300 ft. or 396 m. (37598).

Toddalca asiatica, Lamk. *T. aculeata*, Pers.: Hook. f., Fl. Brit. Ind. i, p. 497. A large sprawling shrub in distribution Indo-malaysian, and through China. In *Zone 3* it was at Renging (36727): (in *Zone 4*) it is rather common about Rotung (37385) and was found by a pathside at Ponging, over the mouth of the Yamne river; and also by a small stream at its entrance into the Dihang between Yambung and Sissin at 1,000 ft. or 305 m. (36016).

Glycosmis cochinchinensis, Pierre. *G. pentaphylla*, Correa: Hook. f., Fl. Brit. Ind. i, p. 500. A shrub in distribution Indo-malaysian, and through Malaya to Australia. It is not uncommon in the forest of the Plain (in *Zones 1 and 2*) as undergrowth attaining 3-4 m. in height, e.g., at Kobo (37026, 37103, 38104) and between Pasighat and Janakmukh (36476, 36847). It occurs (in *Zone 3*) about the edge of the Hills close to Janakmukh at 1,200 ft. or 366 m. (36502), in the Serpo valley at 1,400 ft. or 427 m. (36316, 36320, 36695) and over Balek to 2,000 ft. or 610 m. (36952). Its flowering period seems to be prolonged as fruits were ripe in January and February from some flowering of a few months previously, and the shrubs came into flower again in March.

Glycosmis sp. A shrub with simple leaves which are broadly elliptic or obovate, in dimensions up to 15 by 6.5 cm.; and with flowers that are relatively large, found (in *Zone 3*) near Renging camp (36729).

Glycosmis sp. A bush with pinnate leaves, whose leaflets may be up to seven in number, elliptic-obovate or elliptic, harsh, in dimensions up to 18 by 6 cm. The panicle of flowers is rusty pubescent, and the flowers are relatively large. It was found (in *Zone 3*) near Renging camp (36655).

Glycosmis sp. A low bush 1.2 m. high, spreading (in *Zone 3*) over rocks at 3,400 ft. or 1,036 m. upon the south face of Bapu (36525), and at Renging camp (36610) as well as above it at 2,800 ft. or 853 m. (36334). The leaves are simple, obovate, acuminate, in dimensions up to 16 by 5.5 cm.; and the flowers are relatively small.

Micromelum pubescens, Blume. Hook. f., Fl. Brit. Ind. i, p. 501. A small evergreen tree, in distribution Indo-malaysian. Gammie observed it (in *Zone 1*) to be one of the prevalent smaller trees of Sadiya (Records Bot. Survey India, i, p. 71). It occurs in dense shade at Kobo (35932, 37023) and again (in *Zone 2*) in the forest at Pasighat (36759), (in *Zone 3*) at Janakmukh (37257) and (in *Zone 4*) in the gorge of the Dihang under Rotung at 1,200 ft. or 366 m. Its white flowers were found in March, and its black fruits in December.

Micromelum ? A tree of small size found (in *Zone 4*) upon the hillside at 1,000 ft. or 305 m. above Puak camp (36034), sterile when found.

Murraya exotica, Linn. Hook. f., Fl. Brit. Ind. i. p. 502. A large shrub or small evergreen tree, in distribution Indo-pacific, occurring in the plains under the Abor Hills chiefly upon the pleistocene gravels in *Zone 2*, as towards Lokpur and Pilung (38205), Pasighat (36750) and yet more commonly between Pasighat and Janakmukh (36846). (In *Zone 3*) it reaches 2,100 ft. or 640 m. over Balek and over Janakmukh, and occurs (in *Zone 4*) by the mouth of the Yamne river. It was in flower in March.

Clausena heptaphylla, W. & A. Hook. f., Fl. Brit. Ind. i. p. 504. A shrub or small tree, in distribution Indo-burmese, but somewhat irregularly so. It occurs (in *Zones 1 and 2*) in the Plain at Kobo (36774, 36800) and near Pasighat (37440).

Clausena Wampi, Blanco. Hook. f., Fl. Brit. Ind. i. p. 505. A Chinese fruit-tree which is cultivated from India to Malaya. It was found (in *Zone 3*) in the village of Balek (36899).

Citrus aurantium, Linn.: Hook. f., Fl. Brit. Ind. i. p. 515: Brandis, Ind. Trees, p. 123. This, the Orange tree, has been found wild along the lower slopes of the Himalaya, in the Khasia Hills, and the State of Manipur, and on hills in the Deccan peninsula. It was found wild (in *Zone 1*) in forest near Kobo (35931, 37029). But because the trees were weak, I consider them as remnants from old cultivation, and not self-persisting. The fruit peeled clean, and contained about six loculi with a little rather flavourless juice, and an abundance of seeds.

The Abors cultivate the Orange close to most if not to all of their villages. A Citrus tree being Shing-kin, the Orange is Te-rang-shing-kin and Um-ti-rang-shing-kin and Um-tira-shing-kin.

Citrus medica, Linn. var. **acida**. Hook. f., Fl. Brit. Ind. i. p. 516. This as a citron-like fruit of very sharp taste, is quite likely to be of Indian origin and it turns up here and there in India, in cultivation. Cooper in his book "The Mishmi Hills" 1873, p. 258, states that the Hkamtis, who a century and a quarter back migrated west from Upper Burma into the head of the Brahmaputra plain, introduced an inferior "pomelo": by which I think he means the sour inferior "Bortanga" that is now grown (in *Zone 1*) about Sadiya (32552) and is used for chutneys. Just such an inferior fruit the Abors possess (in *Zones 3 and 4*); its rind is twice as thick as the flesh, and the juice is not merely acid but acrid and dries the mouth (36228). The Abors of Balek call it Buduri. Plate 237 of Bonavia's Cultivated Oranges and Lemons of India and Ceylon is of this plant.

Citrus medica, Linn.: var. **limonum**. Hook. f., Fl. Brit. Ind. i. p. 515: Brandis, Ind. Trees, p. 123. This, the Lemon tree, has been found wild about the lower parts of hills in various parts of India, and was found wild in the Abor Hills (*Zone 4*) in forest long returned from cultivation, close to the north bank of the Dihang river opposite Rotung at 700 ft. or 213 m. (37513). The fruit on the trees (there were two) was in shape and colour a typical lemon.

The Abors call the Lemon Mo-ri-shing-kin.

Simarubaceæ.

Ailanthus grandis, Prain in Ind. Forester, xxviii, 1902, p. 131. A lofty tree, in distribution Eastern Himalayan. It is one of the tallest of the trees of the plains forest, occurring sporadic (in *Zones 1 and 2*) at Kobo and at Pilung (38206).

Brucea mollis, Wall. A. W. Bennett in Hook. f., Fl. Brit. Ind. i. p. 521. A shrub about 3 m. high, in distribution Assamo-burmese. It was collected

(in *Zones 2, 3 and 4*) in fruit in December between 600 and 1,700 ft. or 183 and 518 m., at Pasighat (37451), at Balek (36892) and on old clearings at Rotung (37355). Its fruits hang under the foliage.

Meliaceæ.

Melia toosendan, Sieb. & Zucc. Brandis, Ind. Trees, p. 140. A somewhat small tree, in distribution Assamo-burmese, which was found (in *Zone 1*) near the river Brahmaputra near Pobamukh (38226), in flower in March.

Dysoxylon binectariferum, Hook. f. Hiern in Hook. f., Fl. Brit. Ind. i. p. 546. A moderately large tree, and conserved in Assam, in distribution Indian, extending to Upper Assam. It was found of no great size in the forest (of *Zone 1*) between Kobo and Pobamukh (37038).

Dysoxylum procerum, Hiern in Hook. f., Fl. Brit. Ind. i. p. 547. A very tall tree, in distribution Assamo-malaysian. It was not seen in the plains, but was found (in *Zone 4*) in the Abor Hills, in the Yambung gorge at 900 ft. or 274 m., over Balek at 2,800 ft. or 853 m., and exceeding abundantly between Renging camp and the Lalik valley extending up the hills to 3,500 ft. or 1,067 m. (37341). Its fallen flowers in places strewed the ground thickly on various dates between December 23rd, and January 25th.

Dysoxylon pallens, Hiern in Hook. f., Fl. Brit. Ind. i. p. 548. A rather small tree, in distribution Assamese. It was found on the edge of the Hills (*Zone 3*) at Janakmukh (36479, 37277), and in the Serpo valley close to Renging camp (36840). It flowered at the end of January and in February.

Chlsocheton paniculatus, Hiern in Hook. f., Fl. Brit. Ind. i. p. 552. A large tree in distribution Assamo-burmese. It was observed (in *Zone 1*) in the forests of the Plains as at Kobo (35918), and (in *Zone 2*) Pasighat (38140); and also in the Hills as (in *Zone 3*) at Renging camp (36622) and (in *Zone 4*) Rotung. Its fruits turning from yellow to rose made it conspicuous between December and February. Though capable of being larger, it rarely exceeded in height 50 ft. or 15 m.

Aglala perviridis, Hiern in Hook. f., Fl. Brit. Ind. i. p. 556. A small tree, in distribution Assamese, with one of its limits in Chittagong. It was collected (in *Zone 3*) only near Renging camp (36718, 36835).

Aglala chittagonga, Hiern in Hook. f., Fl. Brit. Ind. i. p. 559. A rather small tree, in distribution Assamo-burmese, found (in *Zone 3*) in the high

forest at Janakmukh (37471), at Renging camp (36649, 36651), in the Magnolia forest upon the south face of Bapu at 4,600 ft. or 1,402 m. (36568), and (in Zone 4) at the mouth of the Side river (36050). The Abors call it Gonyih.

Aglaiia sp. A small tree with compound pinnate leaves, the elliptic pinnae five, about 13 by 4 cm. in dimensions and drying purplish, found (in Zone 4) above Rotung in oak forest at 3,900 ft. or 1,189 m. (38195), and above the head of the Igar stream.

Amoora polystachya, Hook. f. & Jackson. *A. Rohituka* W. & A.: Hiern in Hook. f., Fl. Brit. Ind. i. p. 559. A tree of moderate size, in distribution Indo-malaysian. It was found (in Zone 2) in the Plains at Pasighat (37444), and thence (in Zone 3) up to 3,500 ft. or 1,067 m. above Upper Renging camp (36280). The position in which the big fruits hang is interesting; they depend from the lower branches into the light diffusion space of the forest. The Abors call the tree Galing.

Cedrela febrifuga, Blume, var. *assamensis*. C. DC. in *Records Bot. Survey India*, iii, 1908, p. 373. A lofty tree, and doubtless meant to be included under the name of "*C. Toona*" in the reserved trees of Assam, in distribution Assamo-malaysian and into Indo-China. It is general in the Plains (*Zones 1 and 2*), where it attains the top of the forest, as at Kobo (35974), Pobamukh, Behrung, Pilung and Lokpur: and it is plentiful along the course of the Dihang as (*Zone 3*) at Janakmukh, (*Zone 4*) in the gorge under Rotung, at the mouth of the Sireng river (37588), Puak, Yambung, and near the mouth of the Yamne river. Then again it was away from the course of the Dihang in the Lalik valley, and also near Kalek, and again over the Libang stream. The greatest altitude at which it was observed was 2,600 ft. or 792 m. It goes leafless in January, and produces new leaves in February. The Abors call it Ban-ji or Ke-ji.

Chickrassia tabularis, A. Juss.: Hiern in Hook. f., Fl. Brit. Ind. i. p. 568. A tall tree, yielding valuable timber and reserved in Assam, in distribution Indo-malaysian. It is one of the big trees of the Plains forest (in *Zone 2*) just under the Abor Hills and as far out as Behrung (38218). It was observed at Pilung and Pasighat, whence it extends up the course of the Dihang (in *Zones 3 and 4*), at least as far as the Sireng stream (37590). As a tree of only moderate size it was observed between Renging camp and the Lalik valley at about 2,000 ft. or 610 m. (36376). The trunk is little buttressed, straight, and finally branches into a quite narrow crown at the very top of the forest. One big individual left standing in Pasighat camp was found to be 174 ft. or 53 m. in height. It flowers from the end of January, going bare at the same time: at the end of February bare trees of it were perhaps most conspicuous.

Olacaceae.

Erythrolalum vagum, Mast. in Hook. f., Fl. Brit. Ind. i. p. 578. A woody climber, in distribution Assamese. It was found (in *Zone 3*) in the Hills near the Janak stream (37295), and near Renging camp (36632), with ripe fruit in December.

Lepionurus sylvestris, Blume. *L. oblongifolius*, Mast. in Hook. f., Fl. Brit. Ind. i. p. 583. A shrub or small tree, in distribution Assamo-malaysian. Griffith in 1836 managed to get a few plants by means of a collector from out of the "Abor Hills," and this among them (Masters, in *loc. cit.*). It is prevalent (in *Zone 1*) about Sadiya (Gammie in *Records Bot. Survey India*, 1, p. 71). It was found, (in *Zone 2*), growing to a height of about 2 m., at Pilung (38204) and at Pasighat (36755, 36766) : but not in the Abor Hills themselves, a circumstance which suggests that Griffith's collector scarcely got into the Hills.

Gomphandra axillaris, Wall. Mast. in Hook. f., Fl. Brit. Ind. i. p. 586. A shrub, in distribution Assamese. It was found (in *Zone 3*) at Janakmukh (36482) and at 5,500 ft. or 1,676 m. upon the water-parting between the Serpo and Igar streams (36215), with its fruits hanging under horizontal branches in January.

Natsiatum herpeticum, Ham. Mast. in Hook. f., Fl. Brit. Ind. i. p. 595. A climber, in distribution Assamo-burmese, but extending beyond the Bengal plains to the Circars. It was found in small openings in the high forest (in *Zone 1*) at Sadiya and Kobo (36780) and (in *Zone 2*) at Pilung ; and in the Hills on clearings (in *Zone 4*) at Ponging, Rotung, Kebang and Yambung.

Miquella Kleinii, Meissn. Mast. in Hook. f., Fl. Brit. Ind. i. p. 593 : *Jenkinsia assamica*, Griff. in Calc. Journ. Nat. Hist. iv, 1843, p. 231. A big climber, in distribution Assamese, which was obtained by Griffith (in *Zone 1*) at Sadiya.

Cardiopteryx moluccana, Blume. *Cardiopteris lobata* R. Br.: Mast. in Hook. f., Fl. Brit. Ind. i. p. 537. A herbaceous climber, in distribution Assamo-malaysian, extending to Papua. It occurs in the Abor Hills (in *Zone 4*) upon the edges of clearings as east of the Dihang river near Yambung : upon a hill over the Libang stream at 2,100 ft. or 640 m. and west of Paugi : also upon the bank of the Dihang river between Yambung and Siein. All these places are as far back in the Hills as my explorations took me.

Celastraceae.

Euonymus kachinensis, Prain in Journ. As. Soc. Bengal, lxxiii, p. 193. A shrub almost endemic, having been obtained only in the Kachin Hills of Northern Burma before it was gathered upon the lower slopes of the Abor Hills (in *Zone 3*) between Janakmukh and Aieng (36468). The fruit is a little longer in the Abor specimens than in the Kachin specimens.

Euonymus frigidus, Wall. Lawson in Hook. f., Fl. Brit. Ind. i. p. 611. A straggling shrub, in distribution Assamese, found only (in *Zone 3*) near Renging camp (36641) in flower in February.

Euonymus theacifolius, Wall. Lawson in Hook. f., Fl. Brit. Ind. i. p. 612. A shrub, in distribution Assamese, extending to Central Nepal. It occurs, attaining 2 m. in height on high dry ridges (on the north edge of the wet *Zone 3*) such as a "razor edge" at 5,100 ft. or 1,554 m. between the head waters of the Serpo and Lalik streams (36357), and the summit of Bapu at 6,240 ft. or 1,910 m. (36559). It was in fruit in January.

Euonymus sp. A climber, by no means uncommon in the Plains (*Zone 2*) as at Behrung (38217), Pilung (38130) and Pasighat (36761, 38146), and again (in *Zone 3*) upon the very summit of Bapu at 6,266 ft. or 1,909 m. It bore flowers in February and March and produced new leaves with them; these leaves are ovate, glabrous, in dimensions 10 by 5.5 cm.: the flowers are green. On the summit of Bapu it appeared to be more of a bush and less of a climber than under the Hills.

Euonymus sp. A considerable woody climber, growing to a length of at least 40 m. and reaching to the top of the forest, climbing by abbreviated branches which twine round a support and grow but a few centimetres beyond, found (in *Zone 3*) close to the Dihang at Janakmukh (37192) and (in *Zone 4*) in a similar position at Yambung. The leaves are broadly elliptic, and in size 18 cm. by 9 cm.; the flowers were all galled.

Celastrus Championii, Benth. Forbes & Hemsl. in Journ. Linn. Soc. xxiii, 1886, p. 122. A large climber, in distribution Assamo-malaysian and to the China coast, found (in *Zone 3*) upon the east slope of the summit of Bapu at 5,700 ft. or 1,737 m. (36972). In March the ground where it grows was littered with its brilliant orange seeds that birds had scattered.

Celastrus sp. A shrub found (in *Zone 4*) at Puak at 800 ft. or 244 m. (37635), and in the gorge of the Yambung stream at 1,200 ft. or 366 m. (37762) in fruit only. The capsule looks outside like the smoothest white kid leather, and dehiscing exposes orange-yellow seeds.

Microtropis discolor, Wall. Lawson in Hook. f., Fl. Brit Ind. i. p. 614. A shrub or small tree, in distribution Himalayo-burmese. It was found making part of the lesser growth (in *Zone 3*) in forest near the Rammidambang clearing (36484), in the Serpo valley at 1,600 ft. or 488 m. (36386), and above Renging camp at 3,500 ft. or 1,067 m. (36277). The plants attained about 5 m. in height: they flowered in January.

Microtropis sp. A small sparingly branched shrub, scarcely 3 m. high, found in oak forest on hill-crests (in *Zone 3*) upon a hill top south of Renging camp at 4,400 ft. or 1,341 m. and beyond at 5,100 ft. or 1,554 m., and again upon a third hill top which lies in the water-parting between the Serpo and Igar streams at 5,500 ft. or 1,676 m. (36206); and (in *Zone 4*) over the head of the Lalik stream at 4,000 ft. or 1,219 m. (36385). Its minute white flowers were found in January, and at the same time its red fruits were ripe.

Gymnosporia acuminata, Hook. f. ex Lawson in Hook. f., Fl. Brit. Ind. i. p. 618. A large shrub or small tree, in distribution Assamo-burmese, found (in *Zone 3*) in forest at Janakmukh (37176, 37248, 37456, 37476) in the bottom of the Serpo valley at the Renging refuge village, at Renging camp (36609), (in *Zone 4*) by the bank of the Dihang under Ponging (36145) and west of Renging at 2,600 ft. or 792 m. (36262).

Gymnosporia, near *G. acuminata*, Hook. f. A small shrub found (in *Zone 3*) upon the Janak stream (37287) and (in *Zone 4*) at 3,600 ft. or 1,097 m. above Kalek (37566), in fruit.

Salacia prinoides, DC. Lawson in Hook. f., Fl. Brit. Ind. i. p. 626. A sprawling shrub, chiefly of tidal regions as in Malaya, but elsewhere about the lowest slopes of the hills adjoining the Assam and Bengal plains, and in Burma, so that its distribution is in a way Assamo-malaysian, but extending to the Circars. It was found (in *Zone 3*) in Balek village at 1,400 ft. or 427 m. (36509), with dull orange flowers at the end of January, and near Renging camp (36729).

Salacia latifolia, Wall. Lawson in Hook. f., Fl. Brit. Ind. i. p. 629. A sprawler, in distribution Assamo-malaysian, found (in *Zone 3*) at Renging camp (36739) with its large red fruits ripe in the end of February.

Salacia sp. A tree found (in *Zone 2*) upon the edge of the Sirin river near Pasighat (38148), producing buds at the end of February, its leaves obovate, measuring 7 by 2.75 cm.

Salacia sp. A bush, found (in *Zone 3*) by Renging camp coming into flower in March, its leaves obovate, rounded above under a short abrupt acumen, in dimensions 12 by 6 cm. (36722).

Rhamnaceae.

Ventilago maderaspatana, Gaertn., var. *calyculata*, (Tulasne); var. b. W. & A. Prod. Fl. pen. Ind., 1834, p. 164: *V. calyculata*, Tulasne. Lawson in Hook. f., Fl. Brit. Ind. i, p. 631. A large climber, in distribution Indo-burmese. It is probably not uncommon in the Abor Hills, but, on account of the great difficulty in detecting it in the overhead foliage of the forest, it was observed once only (*Zone 4*), in the oak forest over the head of the Igar stream at 4,000 ft. or 1,219 m. (36190), with ripe fruit in January.

Zizyphus jujuba, Lamk. Lawson in Hook. f., Fl. Brit. Ind. i. p. 632. A small tree or bush, furnishing several cultivated races, wild only in the Abor country, in distribution Indo-malaysian. It occurs (in *Zone 1*) scattered through the grazing land at Sadiya, and again sparingly upon the Kemi chapri. It is however absent from the narrower and damper Pilung chapri. In the Hills it was found (in *Zone 3*) at Balek village only. The Abors call it Gangen.

Zizyphus rugosa, Lamk. Lawson in Hook. f., Fl. Brit. Ind. i. p. 636. A large deciduous half-sprawling shrub, in distribution Indo-burmese. (In *Zone 1*) it is very common at Kobo (37078) in the var. *glabrescens* and was observed (in *Zone 3*) just within the Hills at Balek (36897).

Rhamnus nepalensis, Wall. Lawson in Hook. f., Fl. Brit. Ind. i. p. 640. A shrub, in distribution Assamo-burmese. When clipped, it makes a good hedge in Dibrugarh. It is common in the upper part of the Assam valley in places where it gets sun. It occurs (in *Zone 1*) at Sadiya, and at Kobo (37410) by the edge of the Kemi chapri. It was found (in *Zone 3*) on the edge of forest at Janakmukh over the river, and between Janakmukh and Aieng (37228), and again (in *Zone 4*) upon the clearings of both Ponging and Rotung. Its red berries were ripe in November.

Hovenia dulcis, Thunb. Lawson in Hook. f., Fl. Brit. Ind. i. p. 640. A tall tree, considered to be a native of China, whence by cultivation it has been spread along the base of the Himalaya as far west as Chamba, and into the Naga Hills. Being tall and long-lived, it far outlasts the wandering cultivation of Assam, and persists as the old clearing passes into high forest. Griffith (*Trans. Agri.-Hort. Soc. India* v, 1838, p. 123) names it (for *Zone 1*) in his list of Sadiya plants as "found in Singpho jungle," but I do not exactly

understand his expression. It is not uncommon at Kobo (37090), and again (in *Zone 4*) by the Dihang at the mouth of the Yamne river, as also along the Sissin-Yambung trail which is close to the river bank for a considerable way. It stands leafless from the middle of November, at the same time shedding the small branches which carry the ripe fruit.

Gouania leptostachya, DC. Lawson in Hook. f., Fl. Brit. Ind. i p. 643. A large sprawling shrub, in distribution Himalayo-malaysian (in *Zone 1*). It is common in partial shade at Sadiya (32687) and at Kobo (35924). It occurs (in *Zone 3*) in the Hills as at Janakmukh (36481), by the Sipi stream, east of Balek, and (in *Zone 4*) at Rotung (37384), being common at the last-named place. The Abors call it Shi-tat-kher. It was found in flower in the Hills and the plains under them in the end of February, and was also in flower at Sadiya in August.

Rhamnacea ? or Euphorbiacea or Urticacea. A very curious shrub, found sterile only, having its lower side-branches turned into stout spurs up to 12 cm. long and appearing useful for assisting the rather spongy stem in sprawling over other vegetation. It was found twice only, once (in *Zone 2*) upon the Pilung chapri, there present in abundance, and the other time (in *Zone 3*) upon a stony clearing in the Serpo valley at 1,700 ft. or 518 m. (36314).

Ampelidaceae.

Vitis repens, W. & A. Lawson in Hook. f., Fl. Brit. Ind. i. p. 646. A fairly large climber, in distribution Indo-malaysian. It was found (in *Zone 4*) in the gorge of the Dihang river under Rotung at 1,000 ft. or 305 m. (37377), with its black berries ripe and conspicuous on the red pedicels in December.

Vitis heyneana, DC. *V. lanata*, Lawson in Hook. f., Fl. Brit. Ind. i. p. 651 (in part). A big climber, Indo-burmese in distribution, but irregularly so, found in the forest at Kobo (36779).

Vitis bracteolata, Wall. Lawson in Hook. f., Fl. Brit. Ind. i. p. 654. A climber, in distribution Assamo-burmese. It occurs in open places, and (in *Zone 1*) was found in such at Kobo (37006): and (in *Zone 3*) in the Hills it was found at Janakmukh (37251) upon the bank of the Dihang at upper flood level, and again in corresponding positions (in *Zone 4*) between Puak and Yambung (37687). It was on the clearings of Ponging and Rotung, and on various sides of Yambung among fruit trees, or scrub up to 1,500 ft. or 457 m. towards Kebang, and upon "Signal Hill." Its berries turn brownish and then purple-black in January.

Vitis obovata, Lawson in Hook. f. Fl. Brit. Ind. i, p. 658. A large vine, in distribution Assamese. It occurs (in *Zone 1*) in high forest at Kobo (35920, 35929, 38113), and (in *Zone 2*) on the north edge of the Plains under Balek (36998). Its stout stems can be recognised in the bottom of the forest by their lenticels.

Vitis planicaulis, Hook. f. Lawson in Hook. f., Fl. Brit. Ind. i. p. 658. An enormous evergreen climber, in distribution Assamo-chinese. Its big flat stem is a frequent object in the high forest (*Zone 1*) at Kobo (35934, 35945, 35986, 37015), but is more rarely seen (*Zone 2*) in the forests over the pleistocene gravels from Pilung to Pasighat. In the Hills (*Zone 3*) it is common at Janakmukh (37247) and up the Janak stream, at Renging camp, (*Zone 4*) near the Dihang at Puak and at Yambung, and between Renging camp and the Lalik valley, on the "razor-edge" ridge between the Lalik and Igar valleys at 3,800 ft. or 1,158 m. near Kalek, and at 4,700 ft. or 1,433 m. on the hills immediately south of Rotung, in both the latter places the host plant of *Sapria bengalensis*. Its bronzed new foliage and purplish black fruits were found in December. The broad diameter of the stem is about $2\frac{1}{2}$ times the short. It goes right to the top of the forest.

Vitis lanceolaria, Roxb. Lawson in Hook. f., Fl. Brit. Ind. i. p. 660. A big evergreen climber, in distribution Indo-malaysian. It occurs (in *Zone 1*) in the high forest of the Plains at Pobamukh (37047, 37054), and (*Zone 2*) at Pasighat (36757): and again just within the Abor Hills (*Zone 3*) about Janakmukh and up the Janak stream (37292). Its white berries were ripe in December, and pigeons were observed to swallow them whole.

Vitis rumicisperma, Lawson in Hook. f., Fl. Brit. Ind. i. p. 661. An enormous evergreen climber, in distribution Himalayo-malaysian. It climbs to the top and over the top of high forest; but its thick lenticellate stem continues to hold chlorophyll right from the ground. It was found (in *Zone 1*), in the forest at Kobo (35928) in plenty, but (in *Zone 2*) only rarely upon the pleistocene gravels between Pilung and Pasighat. Within the Hills (in *Zone 3*) it was found at Janakmukh (37271), at Renging camp (36671), (in *Zone 4*) at Rotung in the gorge of the Dihang above Rotung at 4,700 ft. or 1,433 m., over the Libang stream at 2,600 ft. or 792 m., and over the head of the Igar stream at 4,500 ft. in oak forest (36201). It may have been this species which Griffith found in fruit in the month of February at Saikhoa (*Notulæ*, iv, p. 700). In the Abor Hills it was found with new red foliage in January.

A big vine at Kobo appeared to be 300 ft. or 90 m. long. And the position in which it was suspended indicated that it had outlived the supports over which it first grew.

Leea aspera, Wall. Lawson in Hook. f., Fl. Brit. Ind. i, p. 665. Prain, Bengal Plants, i, 1903, p. 340. A shrub, in distribution Indian. It is very much at home in the Abor Hills where it attains a height of over 6 m., lining stream-sides or other small openings in the forest. It occurs (in *Zones 3 and 4*) all along the course of the Dihang river from Janakmukh to Yambung and on the Janak (37300), Yamne and Side streams arching out into the sun. Its stems appear to live for three years; in December one is not yet flowering, another is fruiting and a third is dying.

It was found also upon the clearings of Pangi village and on clearings over the Libang stream.

Leea crispa, Willd. Lawson in Hook. f., Fl. Brit. Ind. i, p. 665. A coarse herb in distribution Indo-burmese. It asserts itself against grass in open places such as (in *Zone 1*) the grazing ground at Sadiya, and the Kemi chapri near Kobo, and also it is to be found near the Brahmaputra banks close to Pobamukh (37012). It is at its best in the Rains, and at their close in November dies down, the leaves turning red, and then the stems breaking up.

Leea indica, (Burm. f.) Merr. *L. sambucina* Willd. Lawson in Hook. f., Fl. Brit. Ind. i, p. 666. A large shrub, in distribution Indo-malaysian, and extended to Australia, collected (in *Zone 3*) at Janakmukh (37164).

Leea trifoliata. Lawson in Hook. f., Fl. Brit. Ind. i, p. 666. A herb about 1 m. high in distribution Assamese, found (in *Zone 1*) in high forest at Sadiya in plenty, near Kobo (35961) and (in *Zone 2*) between Pilung and Pasighat where it was by no means uncommon.

Leea robusta, Roxb. Lawson in Hook. f., Fl. Brit. Ind., i, p. 667. A shrub, in distribution Indo-burmese. It occurs in shade (in *Zone 3*) at Janakmukh (37260), at Renging camp (36711), and (in *Zone 4*) at Rotung upon the steep side of the gorge of the Dihang (37599). It was in fruit in December.

Sapindaceae.

Allophylus zeylanicus, Linn. Hiern in Hook. f., Fl. Brit. Ind. i, p. 673. A small tree or shrub, in distribution irregular, and possibly composed of two species, one occurring in Ceylon, the other Assamese, found (in *Zone 1*) in deep shade at Kobo (37069).

Allophylus Cobbe, Blume, var. *serratus* (Roxb.). Hiern in Hook. f., Fl. Brit. Ind. i, p. 674. A scrambling shrub, in distribution Indo-malaysian

with an extension to Australia. It was collected (in *Zone 4*) in forest in the Lalik valley at 2,300 ft. or 701 m. (37326), and found over Rotung at 3,600 ft. or 1,197 m. and Babuk at 2,600 ft. or 792 m. It bore its brilliant orange-red berries in December.

Aesculus punduana, Wall. Hiern in Hook. f., Fl. Brit. Ind. i, p. 675. A fairly large deciduous tree, in distribution Assamo-burmese. It was obtained (in *Zone 1*) by Griffith near Sadiya (*Notulæ* iv, p. 542 and in *Trans. Agri.-Hort. Soc. India*, v, 1838, p. 122, in which latter place he puts a query after his determination). It is common in the Plains forest at Kobo (36768) and thence (in *Zone 2*) to Pasighat. It comes into new leaf in December, and into flower in February.

Lepisanthes Listeri, King ex Radlkofer in *Records Bot. Survey India*, iii, 1907, p. 344. A tree, endemic, being as far as at present known confined to the Daphla and Abor Hills; by no means uncommon (in *Zone 3*) between Janakmukh and Aieng (36469, 37226) and (in *Zone 4*) up the Dihang valley at Puak at 900 ft. or 274 m. (37683), in the Lalik valley at 3,100 ft. or 945 m. (37346) and above the head of the Igar stream at 3,600 ft. 1,097 m. (36277). It was in flower and in fruit in December, and came into new leaf in January.

Aphania rubra, Radlk. *Sapindus attenuatus*, Wall.: Hiern in Hook. f., Fl. Brit. Ind., i, p. 684. A small tree, in distribution Assamese. It appears to be absent from the forests at Kobo, but was met with as a shrub 3 m. high near (*Zone 2*) Behrung (37106) and just under the Hills north of Pasighat. In the Hills (in *Zone 3*) it was found between Janakmukh and Aieng (36462, 37236), at Janakmukh (36855), at Balek both at 1,300 and at 1,500 ft. or 396 and 457 m. (36510), in the Serpo valley rather plentifully on the north hill slopes (36328, 36843), and at Renging (36676). Then further into the hills (in *Zone 4*) it was observed in the gorge of the Dihang under Rotung but nowhere beyond. The salmon flowers were open in December, and the fruits were nearly ripe in March.

Acer nitcum, Blume. Hiern in Hook. f. Fl. Brit. Ind. i, p. 693. A very large tree in distribution Assamo-malaysian, but somewhat irregularly so. It was found (in *Zone 3*) upon the south face of Bapu at 4,200 ft. or 1,280 m. (36534), the Abors calling it Akilorank.

Acer oblongum, Wall. Hiern in Hook. f., Fl. Brit. Ind. i, p. 693. An evergreen tree of medium size, in distribution Himalayo-chinese extending to the Shan plateau. It was found (in *Zone 3*) at 1,400 ft. or 427 m. on the north side of the Serpo valley (36327), at 4,500 ft. or 1,372 m. between the Serpo and

the Lalik (36374), and over Renging camp. The season of fruit-fall for it had passed before I was able to enter the Hills, and that made it difficult to ascertain the exact abundance of the tree.

Acer Thomsoni, Miq. *A. villosum*, Wall., var *Thomsoni*, Hiern in Hook. f., Fl. Brit. Ind. i, p. 695. A considerable tree, in distribution Assamese. It was found (in *Zone 3*) at 3,700 ft. or 1,128 m. above Renging camp (36373) and at 3,600 ft. or 1,097 m. on the water-parting between the Serpo and Igar streams (36224).

Turpinia pomifera, DC. Hiern in Hook. f., Fl. Brit. Ind. ii, p. 698. A medium-sized evergreen tree, in distribution Indo-malaysian. It occurs (in *Zone 1*) in forest north of Sadiya (32656), and at Kobo (36797). Within the Hills it was found (in *Zone 3*) at Renging camp (36659).

Sabiaceae.

Sabia lanceolata, Colebrooke. Hook. f., Fl. Brit. Ind. i, p. 2. A sprawler, in distribution Assamese. It occurs (in *Zone 1*) in slightly open places near Sadiya, and again not uncommonly at Kobo (37021). On the Pleistocene gravels (*Zone 2*) it is more rare; but was found at Pilung, Lokpur and Behrung. Within the Hills (in *Zone 3*) it was found at Janakmukh (27469), along the Janak stream, at Renging camp (36658), (in *Zone 4*) in the Lalik and in the Igar valleys, near Rotung at 1,800 ft. (36827), near the Side river, upon the edge of the Dihang at Puak and Yambung (37702), and at Pangi village. It was not observed above 2,000 ft. or 610 m. It commenced to flower in November, and was out of flowering in March.

Griffith got a *Sabia* at Sadiya, which probably was this (*Trans. Agri.-Hort. Soc. India*, v, 1838, p. 125).

Meliosma dilleniaefolia, Wall. Hook. f., Fl. Brit. Ind. ii, p. 4. A large shrub or small deciduous tree, in distribution Himalayan. It was found in the Hills (in *Zone 3*) at Balek, at Renging camp (36704), (and in *Zone 4*) by the Lalik stream, as well as in great plenty about Yambung both by the Dihang and on the hillsides towards Kebang. Also it was across the Dihang on hillsides over the Libang stream at 1,400 ft. or 427 m. (37731).

Meliosma simplicifolia, Roxb. Hook. f., Fl. Brit. Ind. ii, p. 5. A medium sized tree, attaining 14 m. in height, in distribution Indo-burmese or Indo-malaysian. It is a by-no-means uncommon tree (in *Zone 1*) of the second line in the forest at Kobo (35976, 37416) and (in *Zone 2*) at Lokpur: within the Hills it was found (in *Zone 3*) near the Dihang at Janakmukh, at

Renging camp (36626), and (in *Zone 4*) from Rotung (36053) to Yambung where it is particularly common. It does appear not to ascend above 2,000 ft. or 610 m., if as high. It flowers from November forwards.

Meliosma pinnata, Roxb. Hook. f., Fl. Brit. Ind. ii, p. 6. A shrub or a small tree, attaining in the Abor Hills as much as 10—13 m. in height, in distribution Assamo-burmese, with an extension beyond the Bengal plain in the Circars. It occurs in the Plains (in *Zone 1*) on the edge of the Kemi chapri, and in the Hills about old clearings (in *Zones 3 and 4*) especially at Rotung (36137), where it was very abundant, and at Balek, and on the Sipi stream.

Mellosma ? A tree with leaves coriaceous, long-elliptic-obovate, acuminate in dimensions up to 30 by 11 cm., found in young bud (in *Zone 3*) at Renging camp (36716), and (in *Zone 4*) at Puak (37642) and by the Side river (36073).

Anacardiaceae.

Rhus semialata, Murray. Hook. f., Fl. Brit. Ind. ii, p. 10. A medium sized tree, the source of chinese galls, in distribution Himalaya-chinese, and now run wild in Java. It was found (in *Zone 1*) in grass-land at Sadiya (35778) in fruit in November.

Rhus Griffithii, Hook. f., Fl. Brit. Ind., ii, p. 12. A tree, in distribution Assamese, found in the Hills (in *Zone 3*) at Renging camp (36672), (in *Zone 4*) over the mouth of the Yamne river, and in an exposed position between Puak and the Side stream at 800 ft. or 244 m., leafless but coming into new leaf in January.

Mangifera indica, Linn. Hook. f., Fl. Brit. Ind. ii, p. 13. The cultivated mango of India, a tree of Indian origin, and wild in some parts of India, including parts of Assam, but not observed really wild in or under the Abor Hills. It is cultivated (in *Zone 1*) about Sadiya (*vide* Gammie in *Records Bot. Survey India*, i, p. 71), and occurs as a relic of former cultivation at Pobamukh. It is called Kedi by the Abors, according to Lorraine, and also Tagung.

Mangifera sylvatica, Roxb. Hook. f., Fl. Brit. Ind. ii, p. 15. A large tree, in distribution Assamo-burmese, extending to Central Nepal, along the Himalaya. It was observed (in *Zone 3*) as a very handsome bluntly pyramidal tree at Rammidambang (36851) and Renging camp (36652). Its fruit was falling as the new leaves appeared in March.

Hollgarna ? A rather large tree with the leaves in tufts at the ends of the branches, these leaves obovate, acuminate, in dimensions up to 30 by 10 cm., falling red in the end of January, found (in *Zone 3*) on the south side of the Serpo valley at 1,300 ft. or 396 m. (36381).

Tapiria hirsuta, Hook. f. Hook. f., Fl. Brit. Ind. ii, p. 28. A large sprawler, in distribution Assamo-burmese, with an extension along the Himalaya to Central Nepal. (In *Zone 1*), it is very common at Kobo on the bank of the river Brahmaputra, and on pathsides or by any other small opening in the forest (36788, 37077, 37405); (in *Zone 2*) it occurs from Pilung to Lokpur.

In the Hills (in *Zones 3 and 4*) it occurs, below 2,000 ft. or 610 m., as, upon the bank of the Dihang under Renging and at Puak, the bottom of the Serpo valley near the Renging refuge village, and just above Renging camp (36736), in the Lalik valley, near the Sidi stream and at Yambung on the stream banks and up the hill side towards Kebang. Its cream-coloured flowers were first produced in the middle of January.

Drimycarpus racemosus, Hook. f. Hook. f., Fl. Brit. Ind. ii, p. 36. An evergreen tree, in distribution Assamo-burmese. It was found (in *Zone 3*), as a large tree with slight buttresses below, and the lower branches falling a little from the horizontal, in the Serpo valley at 1,000 ft. or 305 m. (36379) and at Renging camp (36653).

Spondias axillaris, Roxb. Hook. f., Fl. Brit. Ind., ii, p. 42. A tall tree, in distribution Assamo-burmese; differing from typical *S. axillaris* in going bare for a brief period in January, not infrequent in the Abor Hills, found (in *Zone 3*) above the Rammidambang clearing, in the Serpo valley and at Renging camp as well as above it to 4,000 ft. or 1,219 m. and (in *Zone 4*) over the mouth of the Yamne river, at Ponging, at Rotung, at Puak (37690) and at Yambung camp.

Coriariaceae.

Coriaria nepalensis, Wall. Hook. f., Fl. Brit. Ind. ii, p. 44. A shrub, confined to the margin of water, in distribution Himalayo-burmese. Griffith found it (in *Zone 1*) common on the Brahmaputra above Sadiya (*Trans. Agri.-Hort. Soc. India*, v, 1838, p. 123). It is common on the bank of the Dihang (in *Zones 3 and 4*), below upper flood limit in the Rotung gorge at Janakmukh (37132, 37461), at the mouth of the Sireng river, bearing flowers in December.

Leguminosae.

Crotalaria alata, Ham. Hook. f., Fl. Brit. Ind. ii, p. 69. A half-woody plant in distribution Himalayo-malaysian, which exists under difficulties on account of grass fires, (in *Zone 1*) on the Kemi chapri (38121) and (*Zone 3*) was found also at Janakmukh (37265), and (*Zone 4*) on clearings near Rotung village towards the Sireng river.

Millettia pulchra, Kurz. Baker in Hook. f., Fl. Brit. Ind. ii, p. 104 : Dunn in Journ. Linn. Soc. Bot. xli, p. 150. A small tree, tall-pyramidal in outline, up to 20 m. in height, in distribution Assamo-burmese, and in south China ; Dunn remarks that it has the widest distribution of all the genus. It was a conspicuous tree in the forest (in *Zone 2*) near Pasighat (38136), and again (in *Zone 3*) in profusion from Janakmukh to the forest at the top of the clearings of Rammidambang, when in flower at the beginning of March. Its flowers are white with a green spot in the centre of the vexillum. The variety represented is var. *tomentosa*, Prain, which occurs in Manipur, the Naga Hills and the Ruby Mines district.

Millettia pachycarpa, Benth. Hook. f., Fl. Brit. Ind. ii, p. 106. A small tree, the pods of which are used as a fish-poison, in distribution Assamo-burmese : (in *Zone 1*) by no means uncommon in the high forest at Kobo (37064) and towards Pobamukh (38224), where its pendent new liver-coloured foliage makes it conspicuous in December. A *Millettia* thought to be the same was observed at Janakmukh.

Millettia piscidia, Wight. Baker in Hook. f., Fl. Brit. Ind. ii, p. 107. Dunn in Journ. Linn. Soc. Bot., xli, p. 166. A small tree, in distribution Assamese, found (in *Zone 3*) at Renging, (36680, 36740) where thousands of pods littered the ground in the month of January.

Gymnocladus chinensis, Baill. in Bull. Soc. Linn. Par. i, 1875, p. 34, var. ? A tall straight tree, in distribution Chinese found on a spur (in *Zone 3*) above Renging camp at 4,000 ft. or 1,210 m. (3682) in forest of *Castanopsis* and *Quercus*. It carried fruit in January, and this fruit is thicker than that of typical *G. chinensis*. The plant must be found in flower in order to ascertain if here rightly placed.

Smithia sensitiva, Ait. Baker in Hook. f., Fl. Brit. Ind., ii, p. 148. A tough annual herb, in distribution Indo-malaysian and through southern China, found only (in *Zone 1*) in the grass-land at Sadiya.

Desmodium cephalotes, Wall. Baker in Hook. f., Fl. Brit. Ind., ii, p. 61. A large shrub or at times even a small tree, in distribution Indo-malaysian. It was found only (in *Zone 1*) in the Plains, by the Kundil river east of Sadiya (32668), its slightly fragrant white flowers open in August.

Desmodium laxiflorum, DC. Baker in Hook. f., Fl. Brit. Ind., ii, p. 164. An undershrub, in distribution Indo-malaysian. Gammie recorded it (for *Zone 1*) as a plant of Sadiya (*Records Bot. Survey India, i, p. 71*), and it occurs at Kobo upon the bank of the Brahmaputra (37067). What is believed to be it, was seen also upon the Kemi chapri.

Desmodium parvifolium, DC. Baker in Hook. f., Fl. Brit. Ind., ii, p. 172. An annual herb, in distribution Indo-malaysian and through southern China. It was found (in *Zone 1*) at Kobo (37407), an old plant in fruit. Had it not been old, I should have suspected that it had reached that place by accident through the stores of the Expedition.

Vicia hirsuta, Koch. Baker in Hook. f., Fl. Brit. Ind., ii, p. 177. A weed of crops through the Old World, chiefly in the north temperate zone, quite general in northern India, and introduced into the Abor Hills along with grain from North-western India used by the troops. It appeared (in *Zones 2 and 3*) in Pasighat camp, and again near Renging camp at about 2,000 ft. or 610 m. (36332), flowering in February.

Lens esculenta, Moench. *Ervum Lens*, Linn. Baker in Hook. f., Fl. Brit. Ind., ii, p. 179. The cultivated Lentil, which from being served out to the troops appeared in the camps (of *Zone 1 and 3*) at Kobo and Renging flowering in the end of February.

Shuteria vestita, W. & A. Baker in Hook. f., Fl. Brit. Ind., ii, p. 181. A half-woody climber, in distribution Indo-malaysian. It was found (in *Zone 3*) only upon the Pleistocene gravels near Janakmukh (37264, 37475), both upon the bank of the Janak stream and upon the bank of the Dihang. Its greenish magenta flowers were open in December.

Dumasia villosa, DC. Baker in Hook. f., Fl. Brit. Ind., ii, p. 183. A climbing herb, in distribution in South Africa, Madagascar, and in Asia Indo-malaysian. It was found (in *Zone 3*) near Renging refuge village at 1,400 ft. on the crest of a sharp ridge running through thick forest (36318) and near Renging camp (36735). It carried fruit in January.

Glycine Soja, Sieb. & Zucc. Baker in Hook. f., Fl. Brit. Ind., ii, p. 184. The Soy-bean, widely cultivated in Asia and elsewhere, very much a crop of

China, and from China along the Himalaya, as well as southwards rather sparingly to Java. The Abors grow it and it was found (in *Zone 4*) on their clearings at Rotung.

Mucuna sp. A climbing herb very common (in *Zone 1*) at Kobo, and again (in *Zone 4*) in the gorge of the Dihang under Rotung and at the mouth of the Sireng river, as old dehisced pods hanging upon leafless vines.

Erythrina stricta, Roxb. Baker in Hook. f., Fl. Brit. Ind., ii, p. 189. A small tree, in distribution Indo-burmese but irregularly. It cannot survive in high forest, but exists on river-banks and is planted by the Abors in villages. It occurs (in *Zone 1*) on the Brahmaputra banks at Pobamukh, and (in *Zone 2*) on the Dihang banks at Pasighat (36764), (*Zone 4*) at the mouth of the Sireng river, at Puak and Yambung. In Balek village (*Zone 3*) it was seen planted with *Piper Betle* under it; and at Rotung (*Zone 4*) it was seen on a clearing. It goes leafless in January, and flowers at the end of February. The Abors call it Ta-gat or T-gat.

Mastersia assamica, Benth. *M. cleistocarpa*, Baker in Hook. f., Fl. Brit. Ind., ii, p. 195. A woody climber in distribution Assamese, found (in *Zone 3*) in a patch of tall *Saccharum* at Janakmukh upon the undercliff (37212), (in *Zone 4*) in scrub at Rotung and in forest at Puak at 1,000 ft. or 305 m. (36035).

Pueraria ? bella, Prain. in Journ. As. Soc. Bengal, lxxvii, p. 288. The leaves and stem collected exactly match the plant of the Kachin Hills, which is quite likely to extend to the Abor Hills: but it was found sterile only, as a big woody climber going to the top of high forest (in *Zone 4*) at 800 ft. or 244 m. near the Dihang river by the mouth of the Side (36125) and above Rotung at 4,700 ft. or 1,433 m. The stem is flattened and very twisted, in colour of a light grey.

Vigna Catiang, Endl. Baker in Hook. f., Fl. Brit. Ind., ii, p. 205. A bean universally cultivated through the Tropics, and observed (in *Zone 1*) at Sadiya (32541), but it was not seen anywhere in the Abor Hills.

Pachyrhizus angulatus, Rich. Baker in Hook. f., Fl. Brit. Ind., ii, p. 207. The Yam-bean, cultivated widely in the Tropics, found as a relic of old cultivation upon old clearings (in *Zone 1*) between Kobo and Pobamukh (37014).

Atylosia scarabaeoides, Benth. Baker in Hook. f., Fl. Brit. Ind., ii, p. 215. A biennial climber in distribution in Mauritius, Madagascar, and as to Asia Indo-malaysian. It was found only (in *Zone 1*) near Kobo (37119).

Cajanus indicus, Spreng. Baker in Hook. f., Fl. Brit. Ind., ii, p. 217. The Dal plant, widely cultivated through the Tropics, and especially in India. (In *Zone 3*) the villagers of Balek grew it on their clearings under the names of Tan-gum and Da-yil, which latter is obviously a distortion of the hindi, Dal (36447).

Flemingia congesta, Roxb. Baker in Hook. f., Fl. Brit. Ind., ii, p. 223. A small shrub, in distribution Indo-malaysian. It cannot hold its own in the forest, but is able to do at flood-limit on the bank of the Dihang, where it was found (*Zone 3*) at Janakmukh, (37488). (and *Zone 4*) under Ponging, under Rotung and by the mouth of the Sireng (37395). The highest of these is under 800 ft. or 244 m.

Dalbergia Sissoo, Roxb. Baker in Hook. f., Fl. Brit. Ind., ii, p. 231. Prain in Ann. Roy. Bot. Gard. Calc., X, 1904, p. 57. A fairly large tree, in distribution Himalayan, but widely cultivated also away from the gravels at the base of the mountains where it is at home. It was observed (in *Zone 1*) at Sadiya, doubtless planted; but not where it might have been expected in stony streams beds towards Balek or Janakmukh.

Dalbergia pinnata, Lour. *D. tamarindifolia*, Roxb. Baker in Hook. f., Fl. Brit. Ind., ii, p. 234. A sprawler in distribution Assamo-malaysian, but very nearly related to two species of south-west India. It was found (in *Zone 3*) above Renging camp at 2,200 ft. or 671 m., (in *Zone 4*) by the Dihang river between Yambung and Sissin, and on the hillside towards the Dihang under Kebang at 2,100 ft. or 640 m. (36001) and near Rotung. Its old leaves fall in January.

Dalbergia Oliveri, Gamble. Prain in Ann. Roy. Bot. Gard. Calc., X, 1904, p. 92. A large deciduous tree, in distribution Assamo-burmese but now only for the first time recorded for Assam. It extends to Siam. It was found (in *Zone 3*) in the Serpo valley near the Renging refuge village, (in *Zone 4*) over the mouth of the Yamne river at 1,600 ft. or 488 m. (36159), and at Pongging. It was in fruit in January and was going bare.

Dalhouisia bracteata, Grah. Baker in Hook. f., Fl. Brit. Ind., ii, p. 248. A half climbing shrub, in distribution Assamese, found (in *Zone 3*) below the Rammidambang clearing and on the hill top between Rammidambang and the Serpo valley (*Zone 4*) in the gorge under Rotung, and on the east bank of the Dihang opposite Yambung at 900 ft. or 274 m. being exceedingly common there in secondary jungle (36011).

Mezoneurum cucullatum, W. & A. Baker in Hook. f., Fl. Brit. Ind., ii, p. 258. A large woody climber, in distribution Indo-malaysian. It attains (in *Zones 1 and 2*) the top of the high forest at Kobo, and elsewhere in the Plains is common; but not so common on the Pleistocene gravels as on the loams south of them. In the Hills (in *Zones 3 and 4*) it is by no means rare up to an altitude of 3,200 ft. or 975 m. It flowers in November.

Gleditschia Delavayi, Franchet, Pl. Delav. 1890, p. 189. A big tree, found in the Chinese province of Yunnan, and now added to the Indian flora. It was found (in *Zone 3*) immediately behind Janakmukh camp in high forest, and measured, felled, 120 ft. or 37 m. in height, with a girth at breast-height of 2 m. (37178). Its wood is very brittle, and the branches shattered to a remarkable degree on the fall of the tree. The trunk branched first at 13 m. from the ground, and from that upwards it and the branches bore many epiphytes.

In Upendranath Kanjilal's *Preliminary list of plants of upper Assam from Collections made during 1913-14*, nos. 645 and 646, are species of *Gleditschia* with Abor and Miri vernacular names, which should be compared with this.

Cassia Tora, Linn. Baker in Hook. f., Fl. Brit. Ind., ii, p. 263. An annual weed, in distribution pantropic (in *Zone 1*). It is very common through the grazing land at Sadiya along with *Artemisia vulgaris*, *Pardanthus chinensis*, and other plants which like it are avoided by cattle.

Bauhinia rufa, Grah. Baker in Hook. f., Fl. Brit. Ind., ii, p. 280. A woody climber, in distribution Assamo-burmese, found (in *Zone 3*) in the Serpo valley on the south side at 1,600 ft. or 488 m. (36384).

Bauhinia divergens, Baker in Hook. f., Fl. Brit. Ind., i, p. 282. An unsatisfactory species because it is difficult to diagnose from immature conditions, in distribution Assamo-burmese, unless the Assam specimens assigned to it are wrongly placed, found (in *Zone 1*) in the forest at Kobo (37022), and (in *Zone 4*) at Rotung, sterile only, and therefore doubtful.

Bauhinia purpurea, Linn. Baker in Hook. f., Fl. Brit. Ind., ii, p. 284. A tree of medium size, in distribution Himalayo-malaysian and extended by cultivation to western India. It grows to about 50 ft. or 15 m. in height commonly (in *Zones 1, 2, 3 and 4*) near the Brahmaputra and Dihang all the way from Kobo (37056) to Yambung and sometimes leans out over the river; and ascends the hills to 1,300 ft. or 396 m. in altitude. No. 36760 was collected at Pasighat; and no. 37626 at Rotung.

The fragrant white flowers may be found from November; and leaf change comes in March. The Abors call it Og-yok.

Saraca? A tree with big silvery buds, just bursting in February, and with leaves 11-pinnate, the leaflets lanceolate elliptic acuminate in dimensions 6—9 by 2 cm., found without flowers near Renging camp (36680).

Leucaena glauca, Benth. Baker in Hook. f., Fl. Brit. Ind., ii, p. 290. A rather small tree of American origin, now spread very widely through the Tropics, including most of the damper parts of India. It occurs (in *Zone 1*) at Sadiya (35904).

Leucaena sp. Apparently a new species of *Leucaena* which occurs in the Abor Hills and in the Hkampti country of northern Burma. The late Captain Toppin collected it at Sankai Pai in February 1912 (his numbers 6314 and 3200); and I found it in secondary forest above Upper Rotung camp at 2700 ft. or 823 m. (36092) as a tree 10 m. high with dark glossy leaves and very white wood. The tree carried ripe pods.

Acacia Intsia, Willd., var. **oxyphylla**, Baker in Hook. f., Fl. Brit. Ind., ii, p. 237. A rather considerable woody sprawler, in distribution Indo-malaysian, (in *Zone 1*), exceedingly common at Kobo (35999), and northwards in jungle (in *Zone 2*) on the Plains to Pilung, absent over the Pleistocene gravels, but reappearing at Pasighat, and from Pasighat plentiful (in *Zones 3 and 4*) up the Dihang valley as far as exploration was carried, i.e., to Yambung. It was not observed above 2,000 ft. or 610 m., and only rarely above 1,500 ft. or 457 m. At times it is in high forest, and one vigorous plant in such had a stem 32 cm. in circumference at breast-height; but it is usually smaller. Its seedlings were observed in greater shade at Kobo than any other plant. The Nagas who acted as carriers to the Expedition collected the stems and used them as soap.

Acacia pennata, Willd., var. **arrophula**, (Don), Baker in Hook. f., Fl. Brit. Ind., ii, p. 297. Prain in King, Mat. Fl. Mal. Perims., ii, p. 250. A large climber, occurring in Tropical Africa, and in distribution in Asia Indo-malaysian, the variety Assamese. It is not uncommon (*Zone 1*) at Kobo near the river bank, and on the edge of the Kemi chapri (in *Zones 2 and 3*) it occurs on the bank of the Dihang from Janakmukh (26581) to Pasighat and near the Sipi stream between Balek and Janakmukh where it is plentiful up to 1,600 ft. or 488 m. The Abors call it Tat-kung.

Albizia procera, Benth. Baker in Hook. f., Fl. Brit. Ind., ii, p. 299. The Koroi of Assam, a valuable revenue tree, in distribution Indo-malaysian. The Pilung chapri (*Zone 2*) is fringed with it, and in course of being invaded by its means (38125). It goes bare in February.

Acacia catechuoides, Wall. Prain, Bengal Plants, 1, p. 458. A tree of medium size, in distribution irregularly Indo-burmese, by some regarded as a variety of the wider spread *A. catechu*. It was seen cultivated (in *Zone 3*) in Balek village, but not elsewhere.

Pithecolobium montanum, Benth. Baker in Hook. f., Fl. Brit. Ind., ii, p. 306. An evergreen tree, in distribution Assamo-malaysian, found in mixed forest (in *Zone 4*) upon a spur over Upper Renging camp at 4,400 ft. or 1,341 m. (36299).

Rosaceae.

Prunus persica, Benth. & Hook. f. Hook f., Fl. Brit. Ind., ii, p. 313. The Peach tree, which is cultivated in the cooler parts of India, and as regards the Abor Hills appears to have been brought down the Dihang valley from the direction of China, until it is in a climate hardly fitted for it. So too has it been brought down the valleys of Sikkim, until reaching the over-rainy region right under Darjeeling, the trees never ripen fruit properly though attempting to do so from July to October (Hooker, *Himalayan Journals*, 1891 ed., p. 109). Abor peaches were not seen: but (in *Zones 3 and 4*) a few trees occur in every village. No. 36455 was collected in Balek, no. 36120 in Rotung and no. 37651 in Babuk. Flowers were produced with new leaf in January. The Abors call the peach Kom-bong.

Prunus acuminata, Wall. Hook. f., Fl. Brit. Ind., ii, p. 317. A small tree, in distribution Assamo-burmese, with its western limit in Central Nepal. It was found (in *Zone 1*) at Sadiya (35771) and (in *Zone 3*) in the bottom of the Serpo valley at 1,400 ft. or 427 m., and (in *Zone 4*) over Rotung at 4,000 ft. or 1,219 m. The Miris call it Torejung and eat the slightly sour fruit. Its foliage goes red in November.

Rubus Hamiltonii, Hook. f., Fl. Brit. Ind., ii, p. 328. A low-growing sprawler, in distribution Assamese. This bramble occurs in the plains of Upper Assam both within and beyond the area of this report (e.g., at Makum, 35754). It is plentiful (in *Zone 1*) at Kobo and towards Pobamukh, and also at Behrung. Within the Hills (in *Zone 3*) it occurs at Janakmukh, by the Janak stream, where the break in the forest due to the water gives it the sunlight it needs. Upon the Plains, cultivation had enabled it to find its place. Its white flowers and black drupelets were both found in November and December.

Rubus Burkillii, Rolfe in Kew Bull., 1920, p. 109. A rather large sprawler, endemic. It was found (in *Zone 1*) forming a dense screen along the

edge of the path-side at Kobo where formerly it had been bordered by clearings (35952, 37005). It was found again (in *Zone 3*) on the edge of the Hills by the Janak stream and again (*Zone 4*) by the Side stream, and within them in scrub at Rotung, and on a very steep ridge on the south face of Bapu at 3,500 ft. or 1,067 m., an abnormal spot. Its flowering had been completed by November, and the small bright red drupelets were ripe. Mr. Rolfe says that it is the only Indian species of a small Chinese group.

Rubus lineatus, Reinw. Hook. f., Fl. Brit. Ind., ii, p. 333. A large shrub, in distribution Himalayo-malaysian. An upright bramble, only found once, that (in *Zone 3*) at 4,700 ft. or 1,433 m. on a very steep ridge on the south face of Bapu, an abnormal spot (36965).

Rubus ellipticus, Smith. Hook. f., Fl. Brit. Ind., ii, p. 336. A low-growing half-sprawling bramble, in distribution Indo-burmese. It does not occur on the outer face of the Abor Hills, but appears (in *Zone 4*) behind the first ridge on the clearings of Ponging and Rotung where it is very abundant : and further into the Hills it occurs on the clearings of Kalek, Babuk, Kebang, and upon the clearing east of the Dihang over the Libang stream. On the last it ascends from 1,500 ft. or 457 m. to their limit at 2,600 ft. or 792 m. : at Kalek to 3,300 ft. or 1,006 m. and to 3,500 ft. or 1,067 m. freely over Rotung. In addition to its occurrence on clearings, it was found in the following unusual spots, the banks of the Dihang at the mouth of the Yambung, and at the mouth of the Side, and also all along the river's course on both sides between these two tributaries. It was newly in flower in December.

Rubus lucens, Focke. Hook. f., Fl. Brit. Ind., ii, p. 338. A sprawling bramble in distribution Assamo-burmese. It occurs in the Plains (in *Zone 2*) here and there, as between Lokpur and Pasighat (37112), and just under the edge of the Hills between Janakmukh and Balek (37136). In the Hills (*Zone 3*) it occurs at Janakmukh (37462), and often on old clearings as at Renging camp and about the village of Balek : or (*Zone 4*) over Rotung and over Babuk, on "Signal Hill" over Yambung camp, but it is more common on the "razor-edge" crests of rocks which, because they can if by any means be cultivated occur hemmed in by forest as very damp, but infertile narrow breaks. It was on one of these (in *Zone 3*), on the south face of Bapu at 3,500 ft. or 1,067 m., on another over Renging camp, on a third over the head of the Igar, and very common on a fourth (in *Zone 4*) immediately over Rotung at 3,600 ft. or 1,097 m. At lower elevations it was on a fifth in the bottom of the Serpo valley by the Renging refuge village, and in forest near the mouth of the Side river. Its pink flowers were open in November in the Plains ; but elsewhere only its red drupelets were found.

Rubus lasiocarpus, Smith. Hook. f., Fl. Brit. Ind., ii, p. 339. A sprawling bramble, in distribution Indo-malaysian. It occurs (in *Zone 1*) about Saikhowa (32635) and Sadiya (Gammie in *Records Bot. Survey India*, 1, p. 71). In the Hills (in *Zones 3 and 4*) it may be found on old clearings or just within the edge of forest bordering the clearings at Renging camp, Rotung (36829, 37524), Kalek, Ponging, Babuk, Kebang, and Yambung, from 1,300 to 3,500 ft. or 396 m. to 1,067 m., the more abundantly towards the upper limit. It was also upon the Dihang bank between Yambung and Sissin at 800 ft. or 244 m. Its flowers appeared early in March.

Rubus rosaefolius, Smith. Hook. f., Fl. Brit. Ind., ii, p. 341. An erect bramble, in distribution Himalayo-burmese. Its large orange fruits are eaten wherever it occurs, and the wild tribes of north-eastern India give it encouragement not quite amounting to cultivation. It was found (in *Zone 4*) on the clearings of Rotung and Babuk (37649), on the latter's only high up from 3,000 to 3,400 ft. or 914 to 1,036 m.; but it grows on the Plains. Gammie got it (in *Zone 1*) with double flowers at Sadiya (*Records Bot. Survey India*, i, p. 71). Ta-shin-ta-in appears to be the Abor name for it.

Fragaria indica, Andr. Hook. f., Fl. Brit. Ind., ii, p. 343. A small perennial herb, propagated by runners as by seed, in distribution Indo-malaysian and to Japan as well as westwards to Afghanistan, though montane, able to persist in the Plains on river banks about upper flood limit and a little below it. Griffith recorded it (for *Zone 1*) as common about Sadiya in 1836 (*Trans. Agri.-Hort. Soc. India*, v, 1838, p. 124). I found it near Sadiya upon the side of a tributary of the Brahmaputra (32579), and on the banks of the Brahmaputra at and just below flood limit at Kobo, and (*Zone 4*) upon the banks of the Dihang at Yambung, Kekar-Monying and under Ponging. It was in flower in January. Lorraine calls it in the Abor language Bug-ger.

Potentilla kleiniana, Wight & Arn. Hook. f., Fl. Brit. Ind., ii, p. 359. An annual herb in distribution Indo-malaysian and to Japan. Though montane in India, it descends to the Plains of Upper Assam, and was got (in *Zone 1*) by Gammie at Sadiya upon the banks of the Brahmaputra (*Records Bot. Survey India*, 1, p. 71). Within the Hills (in *Zone 4*) it was found upon the eastern side of the Dihang near Ponging, by the Ibung stream, at Pang, and over the Libang stream at 2,400 ft. or 732 m. (37744). It is curious that it was not found at all upon the western, or better explored, side of the Dihang river.

Photinia integrifolia, Lindl. Hook. f., Fl. Brit. Ind., ii, 1879, p. 381. A smallish tree in distribution Assamese, found (in *Zone 4*) at 5,100 ft.

or 1,554 m. upon the hill-crest between the valleys of the Lalik and the Serpo (36360). In the end of January its old leaves were falling very red: it was not yet in flower.

Saxifragaceae.

Chrysosplenium nepalense, Don. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 400. A small herb, in distribution Assamo-chinese. (In *Zone 4*), found in marshy spots at 5,500 ft. or 1,676 m. abundantly in Ripshing Sieng (36983) and in a pig-wallow on the water-parting between the Serpo and the Igar streams (36205).

Hydrangea sp. A shrub, probably one of the species which occur in Sikkim, observed once (in *Zone 3*) upon an inaccessible place at 4,800 ft. or 1,463 m. on the south face of Bapu, in flower in March.

Dichroa febrifuga, Lour. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 406. A shrub, in distribution Assamo-malaysian and across China, with its western limit in Central Nepal. It is common in the Abor Hills as a shrub 3 m. high, but may attain as much as 8 m., showy with its berries going from crimson to black. (In *Zone 3*) it is very common about Balek from 1,500 ft. or 457 m. upwards (36577, 36885) and (in *Zone 4*) in the oak forest of the Lalik valley at 2,300 ft. or 701 m. (37327, 37343), in oak forest over the Igar at 4,000 ft. or 1,219 m. (36182), over Upper Rotung at 2,500 ft. or 762 m. and at 4,400 ft. or 1,341 m. under the shade of *Castanopsis* trees (36095), and by the side of the clearings of Pangi village at 4,000 ft. or 1,219 m. (37785). An Abor name Morru-taw-tong was got for it at Balek.

Crassulaceae.

Bryophyllum calycinum, Salisb. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 413. A succulent herb, presumably a native of Africa, now widely distributed through the Tropics to many places where it is used as a medicine. (In *Zone 1*), it has been at Sadiya for some years (*vide* Gammie in *Records Bot. Survey India*, 1, p. 71), and, from Sadiya doubtless, it has got to the nearest places in the Abor Hills, namely (in *Zone 3*) the landing place of Janakmukh (36478) and the village of Balek. The Abors call it Kushireng.

Hamamelidaceae.

Altingia excelsa, Noronha. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 429. A lofty tree conserved in the Assam forests, in distribution Assamo-

malaysian. It is one of the tallest of the trees of the lower Abor Hills and extends onto the Plains, often growing with particular associates. Its straight unbranched trunk is twice the depth of its crown, say, 26 m. and the total height thus 38 m. : the girth of such a tree at breast-height is above 2 m. It was not found on the alluvium at Kobo, but was met with (in *Zone 2*) at Pilung. Within the Hills (in *Zone 3*) it was found at Janakmukh (37194), and on the south face of Bapu up to 4,000 ft. or 1,219 m. which is the greatest altitude that it attained : and, next, further into the Hills it became more abundant : it was common in the Serpo valley between 1,000 and 2,000 ft. or 305 and 610 m. (36377, 36385, 38150), particularly upon the northern slope of the valley where it is the more sunny ; beyond Renging camp (35642), (in *Zone 4*) it was seen only on the " razor-edge ridge " between the Lalik and Igar valleys, and near Puak. Leaf-change and flowering occurred at the end of January. The Abors call it Shi-rih.

Rhizophoraceae.

Carallia lanceaefolia, Roxb. G. Henslow in Hook. f., Fl. Brit. Ind., ii, p. 439. A tree of medium size, found in Tenasserim and Malaya, and now first recorded for Assam. It was found (in *Zone 2*) in the Plains forest at Pilung (38211) where it attained the height of 22 m., and in the Hills (in *Zone 4*) in the Lalik valley upon its south-east side at 4,000 ft. or 1,219 m. (36366).

The material is sterile, and Mr. Dunn thinks that it is unwarranted to assign it to this Malayan plant ; but it is an exact match.

Combretaceae.

Terminalia Chebula, Retz. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 446. A large deciduous tree, in distribution Indo-malaysian ; it is conserved in the forests of Assam, being valuable on account of its tanning fruits as well as on account of its timber. It occurs (in *Zone 1*) in the forest at Kobo.

Terminalia myriocarpa, Heurck & Muell.-Arg. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 448. A tall evergreen tree, the Hollok of Assam and there an important revenue tree, in distribution Assamo-burmese. This tree is the commonest in the forests at low levels, both in the Plains and in the Hills as far as explored, ascending as a rule to 2,500 ft. or 762 m., but near Kalek found as high as 3,800 ft. or 1,158 m. (In *Zone 1*), on the alluvium at Sadiya and Kobo (35978) it is on the whole the tallest tree in the forests : in *Zone 2* under the Hills and upon them it is one of the tallest. Its height

is very commonly 40 m., and one felled tree at Pasighat was found to be 50 m. The girth at breast-height of an average well grown tree is 4 to 5 m. but at Kobo one was measured with a girth of nearly 7 m. and (in *Zone 3*) an extraordinary tree found on a very steep slope below Renging camp (36656) had the great girth of $12\frac{1}{2}$ m. above its buttresses, *i.e.*, at 2 m. from the ground on the upper side or 3 m. on the lower. At low levels through (*Zone 4*) to Yambung at least, the species occurs, and the Abors fell it for planking. *Terminalia myriocarpa* makes a fair proportion of the trees in the Kobo forests, but this rose on the Pleistocene gravels north of Pilung to 90 per cent., so that practically pure forest resulted. Plate II-A illustrates this forest in March when the foliage on the trees had become thin.

Fruit was found on trees of 10 m. in height and more, in December.

The Abors call the tree Shu-ilek, a name which suggests the Assamese name Hollok when we divest it of the first syllable which represents "Shing" and implies "tree."

***Calycopteris floribunda*, Lamk.** C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 449. A large sprawler in distribution Indo-malaysian. It was seen (in *Zone 1*) on the edge of the Kemi chapri.

***Combretum dasystachyum*, Kurz.** C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 457. A woody climber, in distribution Assamo-malaysian. It occurs as a big climber (in *Zone 1*) upon the bank of the Brahmaputra at Kobo (36000), and (in *Zone 2*) is very plentiful in the high forest at Pilung, Lokpur and Pasighat (37433); further, within the Hills (in *Zone 4*) it was found in scrub and in forest at Rotung, in the Lalik valley ascending to 2,200 ft. or 671 m., and in the little gorge of the Dihang at Puak. (37673). It was in fruit from December to March.

***Illigera khasiana*, C. B. Clarke** in Hook. f., Fl. Brit. Ind., ii, p. 461. A woody climber in distribution Assamo-burmese. It was found (in *Zone 1*) attaining a considerable size in high forest at Kobo (35987), and in the Hills (in *Zone 3*) above Renging camp at 3,300 ft. or 1,006 m. (36269). Its livid purple flowers were found in November, and above Renging fruits were falling in January.

Myrtaceae.

***Psidium Guyava*, Linn.** Duthie in Hook. f., Fl. Brit. Ind., ii, p. 468. The Guava tree, of American origin, now cultivated widely through the Tropics, and often run wild. The Abors of Balek (in *Zone 3*) have it in their village; but the tree was not seen elsewhere.

Eugenia Wallichii, Wight. Duthie in Hook. f., Fl. Brit. Ind., ii, p. 475. A rather large tree in distribution Assamo-burmese extending to Mergui, and also across the Bengal Plain appearing in Orissa. It attains 25 m. in height, with grey bark and red wood, (in *Zone 3*) in the forest at Janakmukh (37259).

Eugenia ? Kurzii, Duthie. Duthie in Hook. f., Fl. Brit. Ind., II, p. 478. Leaves of a large tree growing in the gorge of the Dihang under Rotung at 1,200 ft. or 366 m. were shot down and appear as if the leaves of this species (38185).

Eugenia aborensis, Dunn in Kew Bull. 1920, p. 109. A tree about 10 m. high, endemic. It is not uncommon (in *Zone 3*) at Janakmukh (37118, 37245), and at Balek (36433) as well as above Balek at 2,500 ft. or 762 m. Further into the Hills it was at Renging camp (36633); (in *Zone 4*) common in the Lalik valley and near Kebang at 2,100 ft. or 640 m. (37800). It is also in the Daphla Hills. Its white flowers in the Abor Hills were produced, hanging under horizontal branches, in December and January. The Abors called it Pon-kar.

Eugenia tetragona, Wight. Duthie in Hook. f., Fl. Brit. Ind., ii, p. 497. A small tree, in distribution Assamo-burmese, found (in *Zone 3*) in the oak forest upon the water-parting of the Serpo and Lalik streams at 5,100 ft. or 1,552 m. (36354). Flowers were produced in January.

Eugenia balsamea, Wight. Duthie in Hook. f., Fl. Brit. Ind., ii, p. 499. A small tree about 7 m. high in distribution Assamo-burmese. In *Zone 3* not uncommon at Janakmukh (37262), Renging camp (36675), and above it to 3,300 ft. or 1,006 m. (36263, 36273). Its flowers were produced in December and January.

Eugenia near *E. fruticosa*, Roxb., with thin elliptic acuminate leaves obtuse below and in dimensions up to 10 by 3 cm., found (in *Zone 4*) as a tree about 18 m. high erect in trunk, but with a small crown, on a hill top at 4,700 ft. or 1,433 m. to the south of Upper Rotung camp (36816).

Eugenia sp., rather similar to *E. inophylla* Roxb., and appearing to be identical with the specimen of Wallich's Catalogue no. 3600-E, from the Khasia Hills, with narrowly obovate acuminate leaves drying purplish below, in dimensions 13 by 4.25 cm., found (in *Zone 4*) upon a hill crest at 4,400 ft. or 1,341 m. above Upper Rotung camp (36294).

Eugenia near *E. oblata*, Roxb., with elliptic acuminate leaves, acute below, in dimensions up to 12 by 4.5 cm., and drying reddish, occurring in the Plains (Zone 2) as a tree about 10 m. high in the open on the Pilung chapri (38123), flowerless in February.

Melastomaceae.

Osbeckia stellata, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 517. A small shrub, in distribution Himalayo-burmese. It prefers open places; and in the Abor Hills was found in only four localities though in them abundantly, all (in Zone 4). One place was an old clearing between Rotung and Ponging and the chief of the associated plants were *Elscholtzia blanda*, *Anaphalis araneosa*, *Potentilla kleiniana*, with an abundance of *Ageratum*—an unusual assemblage. Another place was secondary jungle under *Artocarpus* trees at Yambung (37720). The other two places were old clearings over the Libang stream at 2,100 ft. or 610 m.

Osbeckia crinita, Benth. C. B. Clarke, in Hook. f., Fl. Brit. Ind., ii, p. 517. A very small shrub, in distribution Assamo-burmese, (in Zone 1) occurring at Sadiya (32616), and at Saikhowa (36235), in flower in August.

Osbeckia nepalensis, Hook. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 521. A small shrub, in distribution Assamo-burmese with its western limit in Central Nepal. It grows in clearings and (in Zone 1) is very common in the grazing land at Sadiya. Within the Abor Hills it was found only at Yambung (Zone 4) among planted trees of *Artocarpus* with secondary jungle under them.

Osbeckia nutans, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 521. A small shrub, in distribution Assamo-burmese, with its western limit in Central Nepal. (In Zone 3), found on the undercliff at Janakmukh, at the part where it slips least (37211), and found also near Renging camp (36614).

Melastoma malabathricum, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 523. A small shrub, in distribution Indo-malaysian. Griffith recorded it (for Zone 1) as a plant of Sadiya (*Trans. Agri.-Hort. Soc. India*, V. 1838, p. 121); it is not very abundant there. It occurs (in Zone 2) in small quantity in the beds of *Phragmites* which occur below Balek (36439), and (in Zone 4) at about 1,500 ft. or 457 m. upon the east side of the Dihang opposite Yambung.

The first flowers of the season were opening below Balek in March. The Abors call it Ke-seng or Ke-chi-aing.

Melastoma normale, Don. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 524. A small shrub of open places, in distribution Assamo-malaysian, found (in *Zone 3*) by the side of the Janak stream (37291) in *Saccharum*, (in *Zone 4*) at the upper end of the Yambung gorge at 1,500 ft. or 457 m. (37765), upon the side of a clearing belonging to Rotung village at 2,500 ft. or 762 m. (36096), and upon a cleared hill crest near Ponging towards Jaru at 2,500 ft. or 762 m. (36167). It flowered from December.

Oxyspora vagans, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 526. A large shrub in distribution Assamo-burmese. Griffith recorded it as a plant of Sadiya (*Trans. Agrv.-Hort. Soc. India, v, 1838, p. 121*); it was not seen elsewhere in the Plains; but in the Hills it was by no means uncommon in forest from Janakmukh (37138, 37166) to Yambung, Kebang and Pangi. Over Renging camp and Rotung it ascends to 3,700 ft. or 1,128 m. Its lip-purple flowers were open in December.

Oxyspora cernua, Trimen. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 526. A large shrub, in distribution Assamo-burmese, found (in *Zone 3*) at Janakmukh (37468).

Sarcopyramis nepalensis, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 541. A herb of deep shade, in distribution Assamo-malaysian. It was found (in *Zone 3*) in hill-forest at Renging camp at 1,800 ft. or 549 m. (36689), and (in *Zone 4*) above the Igar stream at 3,400 ft. or 1,036 m. (36099), and between Rotung and Kalek at about 3,300 ft. or 1,006 m. (37579). It was just out of flower in December.

Medinilla rubicunda, Blume. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 547. A small shrub, frequently epiphytic, and if not then growing in moss on rocks, in distribution Assamese. It was found (in *Zone 3*) at Renging camp (36666) and upon the spurs above the camp at 3,500 ft. or 1,067 m. (36278) and at 4,000 ft. or 1,219 m. in forests of *Engelhardtia* and oaks. Ripe red berries were present in January upon the older stems under the foliage.

Medinilla himalayana, Hook. f. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 549. A rather small shrub growing on rocks, in distribution Assamese, found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36558) with fruit hanging under the ends of the branches at the end of January. The Abor call it *Da-vat*.

Memecylon celestrinum, Kurz, For. Fl. Burma, 1, p. 515. *M. grande*, var. *Horsfieldii* C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 558. A small tree, in distribution Assamo-malaysian. It occurred (in *Zone 2*) as a small flat-topped tree at Pasighat (36872) in considerable abundance, and the droppings of birds all round the camp were bilberry-coloured from its fruits in the month of March.

Lythraceae.

Duabanga sonneratioides, Ham. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 579. A tall tree,—a revenue tree of Assam, the soft timber valuable for special purposes,—in distribution Assamo-burmese, but rather widely for it extends westwards along the Himalaya to Central Nepal, and south-eastwards to Tonkin and Perak. It is the Kobo or Kobawh or Kobua of the Abors; and big trees of it are among the tallest (in *Zone 1*) in the forest at Kobo. It is plentiful elsewhere through the plains forest (in *Zone 2*) to Pasighat (37452), and beyond into the Hills (in *Zones 3 and 4*) exceedingly common everywhere up the Dihang valley near the river but only below 1,000 ft. or 305 m. except that it was found at 1,300 ft. or 396 m. in the Rotung gorge. It was in flower at the end of February.

Samydaceae.

Casearia vareca, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 593. A shrub or small tree, in distribution Assamo-burmese. It grows to a height of about 4 m. on the edges of openings in forest or on old clearings. In the Plains (in *Zone 1*) it was found at Sadiya and on the edge of the Kemi chapri (37034). In the Hills (in *Zone 3*) it was upon old clearings at Aieng (37239) and it was also very common at Janakmukh; (in *Zone 4*) at Rotung very common, Kebang, Pangi, and very common above the Libang stream.

Its pale green flowers were produced in December, while the orange seeds were still conspicuous upon the branches.

Passifloraceae.

Carica Papaya, Linn. Masters in Hook. f., Fl. Brit. Ind., ii, p. 599. The Papaya-tree, widely cultivated in the Tropics, is grown (in *Zone 3*) by the Abors of Balek under the name of Omari or Omri-tang.

Cucurbitaceae.

Hodgsonia heteroclita, Hook. f. & Thoms. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 606. A large subherbaceous climber, in distribution Assamo-malaysian, common (in *Zone 1*) in the Plains forest at Kobo (38222) and Pobamukh (37045). Under the name of Thekrai it was found on sale in the Dibrugarh markets for use as a drug. It flowers from March forwards for apparently a long period, and the plants become tenanted by the ant *Oecophila smaragdina* which feeds at the glands of the buds.

Trichosanthes bracteata, (Lam.), Voigt. *T. palmata*, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 606. A large half-woody climber, in distribution Indo-malaysian, and to north Australia, and through China to Japan; common (in *Zone 1*) at Sadiya (32686) and at Kobo, and in the Hills (in *Zone 4*) at Rotung at 1,200 ft. or 366 m. (37591) and at Yambung, in the gorge of the stream.

Trichosanthes cordata, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 608. A large climber, in distribution Assamo-burmese, found (in *Zone 1*) at Saikhowa (32691), with its white flowers open in August.

Trichosanthes cucumerina, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 609. A herbaceous climber, in distribution Indo-malaysian and extending to Australia. It was found (in *Zone 1*) in the forests of Kobo (37025, 37420) with ripening fruits in December.

Lagenaria vulgaris, Seringe. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 613. The cultivated Bottle Gourd, found (in *Zone 4*) upon the clearings of Rotung, and probably somewhat generally cultivated in the Abor villages.

Luffa acutangula, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 615. A herbaceous climber commonly cultivated in the Eastern Tropics, and elsewhere, and grown (in *Zone 1*) in gardens about Sadiya (32544).

Benincasa cerifera, Savi. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 616. The cultivated Wax Gourd, which is grown (in *Zone 1*) at Sadiya and (in *Zone 4*) was found upon the clearings of the Abors of Rotung,

Momordica dioica, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 617. A herbaceous small climber, in distribution Indo-malaysian, plentiful (in *Zone 1*) at Sadiya (32643) bearing its pale yellow flowers in August.

Cucumis sativus, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 620. The cultivated Cucumber, grown (in *Zone 1*) by Miris and Nepali settlers on the banks of the Kundi river near Sadiya, in a race with fruit which is dull yellow when ripe and about 35 cm. long and 10 cm. in diameter (32551). It is called Tionh.

Cucumis Melo, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 620. The cultivated Melon, grown (in *Zone 1*) in two races about Sadiya (32542), one Ghim by name with fruit of a bright green blotched with white along longitudinal lines, and not bitter at all, and the other (32543), Ghimoru by name, of a similar colour but smaller.

Cucurbita moschata Duchesne. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 622. The Musk-melon cultivated widely through the World. It was found (in *Zone 4*) on the clearings of Rotung village in December (37544). Only one race was observed; it had a reddish-orange fruit about 20 cm. in diameter; but the presence in Lorraine's *Dictionary of the Abor language* of several names for melons and pumpkins, viz., Ta-pa, Ta-tar-ta-pa, Gadbuta-pa, Megon-ta-pa and Me-ba suggests that the Abors have more than this one and the next.

Cucurbita Pepo, DC. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 622. The Pumpkin, cultivated widely through the World, and (in *Zone 1*) grown at Sadiya in a race with fruit red-brown and called there Lal Kumra (32540).

Melothria maderaspatana, Cogn. *Mukia scabrella*, Arn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 623. A herbaceous climber in distribution Indo-malaysian and extending to Australia, found (in *Zone 1*) at Kobo (37408).

Melothria. perpusilla. (Blume) Cogn. *Zehmeria hookeriana*, Arn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 624. A herbaceous climber in distribution Indo-Malaysian and to the Liukiu Islands. It was found (in *Zone 4*) at Kalek at 3,600 ft. or 1,097 m. on a clearing (37563) with its dull yellow flowers open and its red berries ripe in the month of December. It climbed to a height of 2 m. Griffith's description of *Bryonia* sp. from the Kundil river near Sadiya (*Notulae*, iv, p. 594) probably refers to this species.

Thladiantha calcarata, C. B. Clarke. *T. dubia*, Bunge. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 631 in distribution Assamo-malayan and in China. A herbaceous climber, reaching 3 m. common (in *Zone 1*) upon the pathside at Kobo (38112) and (in *Zone 2*) found again at Lokpur. Its deep yellow zygomorphic horizontal flowers were open in March.

Actinostemma tenerum, Griffith. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 633. A herbaceous climber, in distribution Assamo-chinese found by Griffith at Saikhoa (*Notulae*, iv, p. 601), and (in *Zone 3*) upon the south face of Bapu at 4,000 ft. or 1,219 m. at Renging camp, (in *Zone 4*) at 3,400 ft. or 1,036 m. over the head of the Igar stream, under Kebang, in the gorge of the Yam-bung, and at 1,800 ft. or 549 m. over the Libang stream.

Gynostemma pedatum, Blume. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 633. A herbaceous climber in distribution Indo-malaysian and in China and Japan, found (in *Zone 1*) in the forest of Kobo (35908, 35971, 37412), and within the Hills (in *Zone 3*) at Renging camp (36710). Its horizontal white flowers and rather dry green berries were found together in November and December.

Alsomitra clavigera, Hook. f. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 634. A rather large slightly woody climber, in distribution Assamo-chinese. It was found (in *Zone 1*) at Kobo (35921), in fruit in November.

Cucurbitacea. A big climber with large gourds lying in a bunch upon the ground while the leaves are carried far above. The material, Mr. Dunn thinks, represents a new genus. The gourds are 30 cm. long by 10 cm. in diameter, with a thin flesh within which are many large woody-coated seeds 3.5 by 2.5 by 1 cm. The stem has high ridges of pale cork and is 2 cm. thick. The leaves are cordate, shortly acuminate, in dimensions up to 24 by 13 cm. This interesting plant was obtained (in *Zone 4*) at 1,600 ft. or 488 m. near Rotung in a hollow (37363) and upon the hillside south of the Libang stream at 2,800 ft. or 853 m. (37742). The gourds were 3 to 6 in number at the base of each stem, green above and pale yellow where in contact with the soil.

Begoniaceae.

Begonia inflata, C.B. Clarke, *see* p. 412.

Begonia laciniata, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 645. A Begonia with leaves sometimes zoned and sometimes not zoned, growing in shade, in distribution Assamo-malaysian, and extending into China. It was met with (in *Zone 3*) first at Janakmukh at 800 ft. or 244 m. (37165), and on the south face of Bapu at 3,800 ft. or 1,151 m. (36531) and it ascended thence to the summit of Bapu at 6,266 ft. or 1,910 m. (36553). It was met with again above Renging camp from 2,600 to 4,000 ft. or 792 to 1,219 m. (36261, 36338). In *Zone 4*, it was in the Lalik valley at 2,300 ft. or 701 m. (37339) and in the Igar valley at 3,200 and 3,400 ft. or 1,036 m. (36102, 36108). It was above Rotung from 3,000 to 5,400 ft. or 914 to 1,646 m. (36237), excessively common

above Babuk at 3,800 ft. or 1,158 m. (37666), in the Yambung gorge at 900 ft. or 274 m. and over the Libang stream at 2,600 ft. or 792 m. Lastly it was over the mouth of the Yamne, and near Ponging. In places it made sheets under the trees. There is red upon the under side of the leaf corresponding to the silver above.

Begonia Griffithii, Hook. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 647. A *Begonia* of deep shade, in distribution Assamese. It was common (in *Zone 3*), at Janakmukh (37275) and in shady oak forest upon the south slopes of Bapu at 2,300 ft. or 701 m. (36909). It was (in *Zone 4*) from Rotung by the Dihang to Kakar Monying (37614). It was found in the Lalik valley at 2,300 ft. or 701 m. (37338) and above towards Renging camp at 2,600 ft. or 792 m. (36257), and upon the hills south of Rotung from 3,000 to 4,500 ft. or 914 m. to 1,372 m. (36299, 38191). Its beautiful white flowers with red hair outside appear in December and their production continues to March.

Begonia Rex, Putzeys. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 647. A *Begonia* of deep shade, in distribution Assamese, with the upper surface of its leaves an intense dark green and zoned, the lower red, which red colour it is that gives the green of the upper surface its darkness. It is common (in *Zone 4*) about Rotung in the gorge of the Dihang between 700 and 1,300 ft. or 213 and 396 m. (37374) on both sides of the river, and down the river at the mouth of the Yamne, and again over Rotung at 3,000 ft. or 914 m. Also it is very common upon the "razor-edge" ridge between the Lalik and Igar streams. Old capsules were found, but no flowers.

Begonia Burkilli, Dunn in Kew Bull., 1920, p. 40. A *Begonia* with blue-green leaves that are sometimes not or sometimes considerably variegated growing in deep shade and seems to require more moisture than other *Begonias* of the same hill sides. It is endemic. It was found (in *Zone 3*) near the Shile and the Janak streams (37121, 37139, 37455) abundantly, by the Serpo stream under Renging camp (36315), and at Renging camp itself (36720), but sparsely in forest of *Vatica Shingkeng*, and on the south slope of Bapu in forest of Talauma at 3,900 ft. 1,188 m. (36910). It was got (in *Zone 4*) over the Igar stream at 3,200 ft. or 975 m. on a steep slope, and found in plenty upon the steep side of the gorge of the Dihang under Rotung (16121) and from thence almost to Ponging (between 700 and 1,300 ft. or 213 and 396 m. (37375). It was also above Rotung at 3,500 ft. or 1,067 m. It was in the gorge of the Yambung stream on a rock facing west (37706).

All its first flowers were male and three weeks passed before female flowers appeared. These flowers are of a very pretty shell-pink, and commenced to appear in January.

Begonia iridescens, Dunn in Kew Bull., 1920, p. 168. An endemic *Begonia* of deep shade, with two large blue-green iridescent leaves, which lie against rocks or more rarely against the soil; if a third leaf is present it is a small one at the base of the inflorescence. The larger leaves may be as much as 40 cm. in length. Often but not always, there are big silver blotches between the veins. It is very plentiful (in *Zone 3*) about Renging camp (36246, 36247, 36673, 36821, 37315) from 1,703 ft. or 518 m., and above it to 5,000 ft. or 1,524 m. (36270) in forest of *Vatica Shingkeng* and in oak forest. It is on the south face of Bapu at about 3,500 ft. or 1,067 m. It is in *Zone 4*, in the Igar valley at 2,300 ft. or 701 m. (37336) and above it at 3,000 ft. or 914 m. (36111).

The male flowers are slightly hooded, and the stamens are directed obliquely upwards under the hood. It produced its salmon pink flowers in January.

When the forest was opened up about Renging camp so that the shade was reduced over the *Begonias*, they turned very yellow and unhealthy.

Begonia scintillans, Dunn in Kew Bull., 1920, p. 111. A pretty creeping species, endemic, the leaves dark green above with or without silver spots, crimson-red beneath. It was found (in *Zone 3*) upon the south face of Bapu at 5,400 ft. or 1,646 m. and to the summit at 6,266 ft. or 1,910 m. (36543, 36928) and again in plenty upon the ridge of Bapu which extends northwards towards Ripshing Sieng. It was also (in *Zone 4*) on the hills above Rotung at 4,500 to 4,800 ft. or 1,372 to 1,463 m. (36219, 36820), which hills are one of the continuations of the ridge extending to Ripshing Sieng. Its flowers are coral-pink, and appeared in the beginning of February. At the time of their flowering there were no other flowers under the trees upon the north slopes of Bapu.

Begonia barbata, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 646. A rather tall bristly *Begonia*, of well drained shady slopes, in distribution Assamo-burmese. It was found (in *Zone 4*) at Puak at 900 ft. or 274 m. (37637), between Puak and the Side river (36130) on the west of the Side river at 1,000 ft. or 3,651 m. (36080), and in the gorge of the Yambung. Its bright red fruits were nearly ripe in January.

Begonia aborensis, Dunn in Kew Bull., 1920, p. 109. A *Begonia* with polished leaves which goes further out on to the Plains than any other, and possibly likes a little more light than any other of those in the Abor Hills; occurring in old clearings for instance, under a covering of *Saurauja* where the sunlight more easily reaches the ground than in high forest. It is endemic. In the Plains (*Zone 2*) it was obtained at Lokpur (36999) and at Pasighat. In the Hills (*Zone 3*) it was found at Janakmukh, above Balek from 2,300 to 3,000 ft. or 701 to 914 m. on the edge of forest of *Vatica Shingkeng*, in the

Serpo valley at 1,300 ft. or 396 m. (36323) by a stream and extending up to Renging camp (36682, 36700, 36833) in *Saurauja* jungle and in *Terminalia* forest ; it was (in *Zone 4*) plentiful on the "Razor-edge" ridge between the Lalik and Igar streams, and by the Igar stream at 2,000 ft. or 610 m. (37530) ; it was near Upper Rotung at the same height (36825) and again at 2,600 ft. or 792 m. (36225) : under Rotung it was in the gorge of the Dihang at 1,300 ft. or 396 m. (37622, 36138, 37376), and over Rotung at 3,000 ft. or 914 m.; it was at Puak, and by the Side stream at 900 ft. or 274 m. (36132) ; over Babuk in forest at 3,800 ft. or 1,158 m. (37663) by the Yambung camp (36025), and in the gorge of the Yambung to 1,500 ft. or 457 m. (37755), and on the hillside under Kebang over the Dihang at 1,800 ft. or 549 m. (37794).

Its flowers are of a very pale pink or almost white, and were produced in January : they face obliquely downwards.

Cactaceae.

Opuntia monacantha, Haw. Burkill in Records Bot. Survey India, iv. 1911, p. 292. A small prickly half-shrubby plant, introduced widely through the Tropics from the south of Brazil, and now existing at Sadiya (in *Zone 1*).

Aizoaceae.

Molluga stricta, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 663. A herb in distribution Indo-malaysian and to Japan, found as a rare weed (in *Zone 4*) upon the clearings of Ponging village at 1,000 ft. or 305 m. (36153).

Umbelliferae.

Hydrocotyle javanica, Thunb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 667. A nearly erect herb, in distribution in Africa, and Indo-malaysian extending to north Australia ; in the Abor Hills a common plant in small openings in the forest (in *Zones 3 and 4*) from Janakmukh (37266) to Yambung, and ascending the Hills about as far as the clearings go ; found at any rate at 3,400 ft. or 1,036 m. on the edge of these and on pathsides. No. 36714 was collected at Renging camp : No. 36081 at Rotung.

Hydrocotyle rotundifolia, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 668. A running herb, growing in more open places than *H. javanica*, and quite different in habit, in distribution Indo-malaysian and through China to Japan, found (in *Zone 1*) as a rare plant in the grass-land at Sadiya (32665) and on relatively new clearings at 1,300 ft. or 396 m. near Rotung (36122).

Centella asiatica, Urban. *Hydrocotyle asiatica*, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 669. A small perennial running herb, in distribution general through the Tropics and Sub-tropics. It was found (in *Zone 4*) between Yambung and Sissin near the bank of the Dihang and at 1,800 ft. or 549 m. upon a hill over the Libang stream.

Eryngium foetidum, Linn. A herb of tropical American origin, cultivated as a seasoning and gradually invading India from the east side, as also Malaya. A native of Sadiya in 1909 volunteered the information to me that the Hkamp-tis had introduced it into Upper Assam about thirty to thirty-five years ago, and this is quite credible. In *Zone 1* it is now wild and plentiful at Sadiya (32642), and at Saikhoa (32693), as also quite generally in the top of the Brahmaputra valley. Further it is grown by the Abors (in *Zones 3 and 4*) under the name of Ori for use as a condiment with flesh. It was seen in the village of Balek (36451) and between Rotung and the mouth of the Sireng (37589) at about 1,000 ft. or 305 m.

Sanicula europaea, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, 670. A herb of very wide distribution through the Old World in temperate regions, and on the mountains of the Tropics. All my localities are within the Hills, though one is as low as 750 ft. or 228 m., but Griffith got it right upon the Plains (in *Zone 1*) on a march from Sadiya east to Chunpura in October 1836 (*Journal*, i, p. 21). It was found in *Zone 3* upon the south face of Bapu at 3,500 and 4,800 ft. or 1,067 and 1,463 m. and (in *Zone 4*) at Kekar Monying on the rock at 750 ft. or 228 m., and close to Yambung, in the edge of the gorge of the Dihang at Rotung at 1300 ft. or 396 m. (36082). On Bapu it was just coming into flower on the last day of January.

Pimpinella tenera, Benth. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 686. A small herb in distribution Himalayan, found (in *Zone 3*) on the waterparting between the Serpo and the Igar in a pig-wallow (36203), and (in *Zone 4*) in the swamp Ripshing Sieng at 5,500 ft., common but flowerless (36982).

Oenanthe benghalensis, Benth. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 696. A herb, in distribution Assamo-chinese somewhat irregularly so, like allied plants growing in or by water, found (in *Zone 1*) on the bank of the Brahmaputra at Kobo (36781) and Pobamukh (38225), just in flower in March.

Araliaceae.

Aralia foliosa, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 723. A small evergreen tree, in distribution Assamese. It was found (*Zone 2*) in

the Plains at Pasighat upon an old clearing : then in the Hills (*Zone 3*) at Renging camp, and (*Zone 4*) beyond from the south end of the Rotung clearings to Yambung very commonly at elevations between 900 and 2,700 ft. or 274 and 823 m. about old clearings. (No. 37520 was collected at Rotung and No. 36046 at Kekar Monying.) It attains a height of about 5 m. and the leaves may ascend 1·2 m. above the stem. It flowered at the end of the year.

Pentapanax Leschenaultii, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 724. An epiphyte or a terrestrial half-sprawling shrub, in distribution Indo-burmese. It was found (in *Zone 4*) only upon the edge of the Ripshing Sieng swamp at 5,500 ft. or 1,676 m. (36979) full of flowers in April, and these diligently visited by Apis (*Journ. As. Soc., Bengal*, N. S. XII, 1916, p. 262).

Acanthopanax aculeata, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 726. A shrub or small tree in distribution Assamo-chinese, extending to Japan. It was found in the Plains (*Zones 1 and 2*) in open places but not abundantly ; it was at Sadiya (35772) for which place Gammie also records it (*Records Bot. Survey India*, i, p. 71), at Kobo, on the edge of the Kemi chapri, and near Pasighat (37437). Its green upwardly directed flowers with white anthers, were open in November and December.

Schefflera venulosa, Harms. *Heptapleurum venulosum*, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 729. A sprawling shrub, in distribution Indo-malaysian and extending to Australia, at times an epiphyte and found (in *Zone 4*) as such at Rotung not uncommonly (36119, 38173), and found also on the hills to the south of Rotung to 4,500 ft. or 1,372 m. It or something very near it was observed (in *Zone 3*) on the summit of Bapu at 6,266 ft. or 1,910 m.

Heteropanax fragrans, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 734. A small deciduous tree in distribution Himalayo-malaysian, extending to China. It was found (in *Zone 1*) attaining the height of 10 m. in the Plains forest at Kobo (37089), and (in *Zone 2*) at Pasighat. In the Hills it was found (in *Zone 3*) upon both sides of the Dihang at Janakmukh (36465), (in *Zone 4*) at Rotung at 1,500 ft. or 457 m. (36083), above Rotung at 4,000 ft. or 1,219 m., and by the Dihang opposite Yambung. It came into flower in November.

Brassalopsis simplicifolia, C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 735. A small tree, endemic, being known only from the Abor and adjoining Mishmi Hills, found (in *Zone 4*) in the Lalik valley at 2,300 ft. or 701 m. (37342).

Brassalopsis speciosa, Decne and Planch. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 737. A small tree, in distribution Assamo-burmese, with its western

limits in Central Nepal and its eastern in Yunnan. It was found attaining the height of 3.5 m. (in *Zone 2*) upon the edge of clearings at Pasighat (36758), and (in *Zone 3*) between the Dihang and Aieng (37227), (in *Zone 4*) at Rotung (38174), and above it to 4,000 ft. or 1,219 m. (36813) in oak forest where it was one of the largest of the plants growing under the light-diffusion space.

Brassaiopsis aculeata, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 738. A small tree, in distribution Himalayo-burmese. It was found (in *Zone 4*) attaining 12 m. in height (36054) and near Rotung, at 1,300 and at 1,600 ft., or 396 and 488 m. (37360), also in the Lalik valley at 2,000 ft. or 610 m. (36240). Its flowers packed close among the petioles were produced in December.

Brassaiopsis magnifica, Dunn in Kew Bull., 1920, p. 134. A small tree, endemic. It is a beautiful Araliad with a woody stem about 3 m. high and 6-7 large leaves. It was found (in *Zones 3 and 4*) in the Hills only, from Janakmukh (37130) to Yambung, and by the Libang stream, at elevations from 700 to 3,100 ft. or 213 to 945 m., being by no means uncommon in the forests. It flowered in December and in January.

Brassaiopsis Griffithii, C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 736. A small shrub, in distribution Assamo-burmese. It was found (in *Zones 3 and 4*) in the Hills only from Janakmukh, to the gorge under Rotung and to Ponging, and in the valleys Serpo, Igar at 3,000 ft. or 914 m. (36104) and Yambung. It prefers the edge of forest.

Macropanax undulatum, Seem. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 738. A small tree, in distribution Assamo-burmese, with its eastern limit in Yunnan. It was found (in *Zone 1*) in the Plains at Kobo (35907), and (in *Zone 3*) in the Hills at Janakmukh (37472), at Renging camp (36690) and (*Zone 4*) over the mouth of the Yamne at 1,400 ft. or 427 m. (36156). It carried its black fruits in November.

Macropanax oreophilum, Miq. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 738. A tree of medium size, in distribution Himalayo-burmese, extending to Yunnan. It was found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36939).

Cornaceae.

Marlea begoniaefolia, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 743. A tree, small or of medium size, in distribution Himalayo-chinese, extending to Japan, found (in *Zone 1*) at Sadiya by Griffith (*Notulae*, i, p. 185).

Caprifoliaceae.

Sambucus javanica, Blume. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 2. A shrub, in distribution Assamo-malaysian, extending through China to Japan. Not uncommon (in *Zone 1*) at Sadiya (35783) in areas that have been disturbed by man ; but very rare at Kobo. In the Hills (in *Zone 3*) on old clearings at Renging camp, (and in *Zone 4*) at Rotung, Kebang, Yambung (36005), and Pangi, from 1,000 to 3,500 ft. or 305 to 1,067 m. with its last flowers at Sadiya in November, but out of flower entirely elsewhere at the time of the Expedition.

Griffith's *S. Ebulus?* got at Sadiya in 1836 (*Trans. Agri. Hort. Soc. India*, V, 1838, p. 130) must have been this species. He refers to it again in his *Notulae*, i, p. 191, and iv, p. 259, and in his *Journal*, i, p. 39. He had it in flower in the end of June.

Viburnum colebrookianum, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 5. A shrub, in distribution Assamo-burmese. It was found, attaining a height of 4 m., its branches reaching to the ground, on the edges of openings in forest and on clearings (in *Zone 1*) north of Sadiya (32650), at Kobo (36772, 37417), on the edge of the Kemi chapri, near Behrung (38122, 38219) and (in *Zone 2*) upon the bank of the Dihang at Pasighat ; then in the Hills (in *Zone 3*) it was by the side of the Sipi stream, and in Balek village at 1,300 ft. or 396 m. (36511), also it was above Balek to 3,200 ft. or 975 m. (36962), and further into the Hills (in *Zone 4*) all about the clearings of the villages of Rotung, Renging, Ponging, and Yambung.

Griffith in 1838 (*Trans. Agri-Hort. Soc., India*, v, 1838, p. 130) recorded a "*Viburnum sp.*" as at Sadiya, doubtless this.

Its upwardly directed flowers were found in March, and at the same time it was in extremely vigorous growth. Large leaves were found as long as 36 cm. in length.

Rubiaceae.

Anthocephalus indicus, A. Rich. *A. Cadamba*, Miq. Hook. f., Fl. Brit. Ind., iii, p. 23. A large deciduous tree, with edible fruit, and conserved in the Assam forests, in distribution Indo-malaysian, but owing to cultivation its natural limits are somewhat undefinable. It was found (in *Zone 3*) on the clearings of Rammidambang (36407). Lorraine calls it Nyopo-bolang.

Neonauclea sp. A tree of a *Neonauclea* was found (in *Zone 4*) abundantly upon a spur over Renging camp from 3,300 to 3,500 ft. or 1,006 to 1,067 m. and again (in *Zone 4*) in the gorge at Puak, at 850 ft. or 259 m. (37643),

sterile unfortunately, with the leaf characters much as in *Neonauclea Griffithii*, Merr., though not an exact match. It is certainly either a *Neonauclea* or an *Adina*.

Uncaria sessilifructus, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 30. A woody climber, in distribution Assamo-burmese, with its western limit in Central Nepal. It was found (in *Zone 1*) at Kobo (37423), and (in *Zone 3*) in the Hills at Balek, on either crest of the Serpo valley, both over Rammidambang and at Renging camp, (in *Zone 4*), in the Dihang gorge under Rotung commonly and close to the river at Puak. It flowered from November forwards.

Uncaria pilosa, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 32. A woody evergreen climber in distribution Himalayo-burmese, found (in *Zone 1*) at Kobo (36769) and in (*Zone 3*) below Balek on the very edge of the Hills (36992).

Wendlandia Wallichii, W. and A. Hook. f., Fl. Brit. Ind., iii, p. 38. A small tree, in distribution Assamese. It was obtained within the Hills. In *Zone 3* it was at Balek (36434), at Janakmukh (37141) and Rammidambang and at Renging camp (36728), (in *Zone 4*) at the mouth of the Yamne (36148), on a low cliff in considerable abundance at 600 ft. or 183 m., and between this place and Ponging; it was also by the Sili stream.

It was in flower in January. The Abors call it Raglu.

Hedyotis scandens, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 57. A sprawler in distribution Assamo-burmese, extending westwards to Central Nepal, found in open places (in *Zone 4*) between Rotung and Kalek at 3,000 ft. or 914 m. (37573), and near Ponging upon a clearing at 2,000 ft. or 610 m. (36142), on "Signal Hill" over Yambung on old clearings, and on the clearings of Pangi village. It was in flower in November and in January.

Hedyotis verticillata, Merrill. *H. hispida*, Retz. Hook. f., Fl. Brit. Ind., iii, p. 60. A diffuse annual herb, in distribution Himalaya-malaysian, crossing the Bengal plain into Chota-Nagpur, and also crossing China. It was found (in *Zone 2*) on sunny clearings common in the Plains at Pasighat; in the Hills (*Zone 3*) at Janakmukh (37256), (*Zone 4*) at Ponging, Rotung, over the Igar at 3,200 ft. or 975 m., at Babuk, Yambung and over the Libang stream at 2,600 ft. or 792 m. It was not seen in flower.

Spiradiellis cylindrica, Wall. Hook. f., Fl. Brit. Ind., iii, p. 76. A small herb, in distribution Assamo-burmese, found (in *Zone 3*) on the gravels about Janakmukh, both along the Janak stream and at upper flood level along the banks of the Dihang, both above and below Janakmukh (37134), in places where it would seem to have been submerged not long before, yet with half-ripe fruits.

Spiradicellis blida, Wall. Hook. f., Fl. Brit. Ind., iii, p. 76. A herb about 30 cm. high, in distribution Assamo-burmese. It was found (in *Zone 3*) between Janakmukh and Balek at 1,000 ft. or 305 m. (36513), and in the village of Balek (36427). The Balek Abors called it *Byan-kat*.

Spiradicellis sp. A small herb, probably an undescribed endemic species only a few cm. high, found (in *Zones 3 and 4*) on clearings over Gondwana rocks at the bottom of the Serpo valley at 1,000 ft. or 305 m., and upon the hillside immediately over the mouth of the Yamne river (36158) at 1,600 ft. or 488 m. with rosettes of leaves upon the ground and in fruit in the month of January.

Polyura geminata, Hook. f. Hook. f., Fl. Brit. Ind., iii, p. 77. A small herb in distribution Assamese, found (in *Zone 3*) upon the south face of Bapu at 3,600 ft. or 1,097 m. upon the pathside (36529) and again higher in the shade of the *Talauma* forest at 4,300 ft. or 1,311 m. (36963).

Ophiorrhiza Mungos, Linn. Hook. f., Fl. Brit. Ind., iii, p. 77. A slightly woody herb in distribution Indo-malaysian, in the Abor Hills apparently uncommon, for it was found only (in *Zone 4*) upon the north face of a hill over the Igar at 3,400 ft. or 1,036 m. (36113).

Ophiorrhiza sp. A half-herb, found (in *Zone 3*) at 2,300 ft. or 701 m. above Balek towards Bapu in oak forest (36521) with reddish fruits at the end of January.

Ophiorrhiza heterostyla, Dunn in Kew Bull. 1920, p. 133. A small slightly woody herb of deep shade, endemic, found (in *Zone 3*) upon the south face of Bapu from 2,500 to 2,900 ft. or 762 to 884 m., below Renging camp at 1,800 ft. or 549 m. (38158) and at Renging camp (36616), (in *Zone 4*) in the Lalik valley at 2,300 ft. or 701 m. (37334), in the Igar valley, above the Igar at 3,400 ft. or 1,036 m. (36116) and over Rotung at 4,600 ft. or 1,402 m. (38171). Its upwardly directed flowers were produced in February and March.

Ophiorrhiza argentea, Wall. *O. Harrisiana*, var. *argentea*, Hook. f., Fl. Brit. Ind., iii, p. 78. A small half-woody plant in distribution Indo-malaysian. It was found in deep shade (in *Zone 4*) in the Dihang gorge under Rotung at 1,000 ft. or 305 m. (37380).

Ophiorrhiza ochroleuca, Hook. f., Fl. Brit. Ind., iii, p. 78. A small half-woody herb about 50 cm. high, in distribution Assamo-burmese, found (in *Zone 4*) in forest of oaks and of *Vatica Shingkeng* from Upper Renging camp at 1,800 ft. or 549 m. (38163) to 4,000 ft. or 1,219 m. above it, in the

Lalik valley at 2,500 ft. or 762 m. (36242), and over the head of the Igar at 4,500 and 4,800 ft. or 1,372 and 1,463 m. (36192, 36200) and in the oak forest over Rotung at 4,400 ft. or 1,341 m. Its nodding inflorescences appeared in the end of January.

Ophiorrhiza ?calcarata, Hook. f., Fl. Brit. Ind., iii, p. 54. A herb in distribution Assamese, collected (in *Zone 3*) near Renging camp (36674). It has softly shortly tomentose unequal leaves pale below, in length 12 to 13 cm.

Carlemania Griffithii, Benth. and Hook. f. Hook. f., Fl. Brit. Ind., iii, p. 85. A herb, in distribution Assamese, found (in *Zone 4*) with the next upon the clearings of Rotung (36705 bis).

Carlemania tetragona, Hook. f., Fl. Brit. Ind., iii, p. 85. A half-woody herb, in distribution Assamese. It occurs in the Abor Hills from 800 to 2,000 ft. or 244 to 610 m. and is commonest low down. Though I did not see it on the plains, one of its localities from Griffith's collections is the Noa Dihing river, a river outside my area, but wherever it was that Griffith saw it, it was at an altitude scarcely higher than Sadiya. I found it on the clearings (in *Zone 3*) of Renging (36705), (*Zone 4*) Rotung (37358) and Babuk.

Silvianthus bracteatus, Hook. f. Hook. f., Fl. Brit. Ind., iii, p. 86. A small shrub, in distribution Assamese, found (in *Zone 3*) at Renging camp (36726).

Silvianthus radiceflorus, C. B. Clarke. A herb, in distribution Assamese, found (in *Zone 4*) near the banks of the Dihang river between Puak and the Side river (37616) at about 800 ft. or 244 m. with its white fruits lying upon the soil, the black seeds in them being ripe early in January.

Mussaenda Roxburghii, Hook. f., Fl. Brit. Ind., iii, p. 87. A shrub, in distribution Assamo-burmese, carrying its limit just into the north of the Malay Peninsula, collected (in *Zone 3*) at Balek (36425) where the Abor call it Akshap.

Mussaenda macrophylla, Wall. Hook. f., Fl. Brit. Ind., iii, p. 89. A large shrub, in distribution Assamo-burmese, extending to Central Nepal and to Yunnan. In the Abor Hills it was found chiefly upon the banks of the Dihang, as (in *Zone 3*) at Janakmukh (37137), and (in *Zone 4*) at the mouth of the Sireng stream (37392), where it associates with some plants uncommon in the Abor Hills as *Cudrania javanensis*. It was also found at 2,100 ft. or 610 m. near Kebang. It was in fruit in December.

Mussaenda glabra, Vahl. Hook. f., Fl. Brit. Ind., iii, p. 90. A woody sprawler, in distribution Assamo-burmese, collected (in *Zone 3*) between Janakmukh and Aieng upon the east side of the Dihang river (36467).

Adenosacme longifolia, Wall. Hook. f., Fl. Brit. Ind., iii, p. 95. A small shrub with arching branches, 2—3 m. high, in distribution Himalayo-burmese or Himalayo-malaysian, extending into China. It occurs in the Abor Hills in dense shade, both low down and upon hill-crests. In *Zone 3* it was at Janakmukh upon the crest of the cliff over the river (37154), and near the Janak stream, at Renging camp, 1,800 ft. or 549 m. (36647, 38151), and up above it on the hill crests of the water-parting of the Serpo and Igar from 4,000 to 5,500 ft. or 1,219 to 1,676 m. (36184, 36217), (in *Zone 4*) on the upper slopes of the gorge of the Dihang at Rotung at 1,300 ft. or 396 m. (37594), on the "razor-edge" ridge between the Lalik and the Igar, and once as an epiphyte on the hills above Rotung at 4,700 ft. or 1,433 m. (36814).

Its white berries were ripe in December. No. 37594 is large leaved and hirsute: but the others are small leaved and glabrous.

Adenosacme stipulata, Hook. f., Fl. Brit. Ind., iii, p. 95. A small shrub, in distribution Assamese, found (in *Zone 3*) in the dense high forest at 2,400 ft. or 732 m. over Renging (37321) and at 3,000 ft. or 914 m.; and (in *Zone 4*) on a tributary of the Igar stream (36105), and at 3,000 ft. or 914 m. over Babuk (37664). It carried its round red berries in December and January.

Adenosacme Listeri, King in Herb. Calc. A shrub about 2 m. high in dense high forest, endemic in the Himalaya from the Daphla to the Abor Hills. It was collected (in *Zone 3*) at Balek (36423) and at 1,800 ft. or 549 m. in the Serpo valley below Renging camp (37321). It was in fruit in December.

Myrioneuron nutans, Wall. Hook. f., Fl. Brit. Ind., iii, p. 96. A small shrub, in distribution Assamo-burmese, extending to Szechuan and to Tonkin. It was found attaining only 60 cm. to 1 m. (in *Zone 1*) in great abundance on the floor of the Kobo forests (35907, 35985, 37020), or (in *Zone 3*) within the Abor Hills at Janakmukh, Renging and above Renging camp at 4,000 ft. or 1,219 m., (*Zone 4*) Balek, Rotung, Babuk, and Yambung. Opposite Yambung on the hillsides over the Libang stream it was in great plenty. It was above Rotung at 3,600 ft. or 1,097 m., above Babuk at 3,800 ft. or 1,158 m., (37653), and its white berries were ripe in November, and once its last flowers were open. It likes the deepest shade.

Webera odorata, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 102. A shrub in distribution Assamo-burmese nearly or Assamo-malaysian as it reaches Penang. It was found under the edge of the Hills (in *Zone 2*) 'at Pasighat (37447) and (in *Zone 3*) between Janakmukh and Aieng (37230).

Brachytome Wallichii, Hook. f. Hook. f., Fl. Brit. Ind., iii, p. 108. A shrub, in distribution Assamo-burmese., It was found (in *Zone 3*) by Renging camp at 2,400 ft. or 732 m. (36249), and upon the south side of Eapu river over Balek upon the edge of forest of *Vatica Shingkeng*, (in *Zone 4*) in dense forest in the Lalik valley at 2,300 ft. or 701 m. (37329), on the "razor-edge" ridge between the Lalik and Igar valleys at 2,300 ft. or 701 m. (37529). It grew to 1.75 m. in height, carrying its white flowers under its horizontal branches.

Randia fasciculata, DC. Hook. f., Fl. Brit. Ind., iii, p. 109. A shrub, in distribution Assamo-burmese. In *Zone 1* it is one of the prevalent "small trees" of Sadiya (Gammie in *Records Bot. Survey India*, i, p. 71). In the Abor Hills (in *Zone 3*) it occurs as a stiff bush 2-3.50 m. high, on the east of the Dihang between Janakmukh and Aieng (36458) at about 700 ft. or 203 m., and (*Zone 4*) from 1,000 to 2,100 ft. or 305 to 640 m. on the hillside between Lebang and the river Dihang (37799). It carried its fruit hanging under its branches in January.

Randia acuminata (Blume) Boerl. *R. Wallichii*, Hook. f., Fl. Brit. Ind. iii, p. 113. A small tree, in distribution Assamo-malaysian, about 10 m. high in oak forest (of *Zone 3*) at 3,800 ft. or 1,158 m. above Renging camp (36305), bearing fruit in January.

Gardeulia campanulata, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 118. A large shrub or small tree, in distribution Assamo-burmese, with an extension beyond the Bengal Plain in Chota-Nagpur. Gammie (*Records Bot. Survey India*, i, p. 71) records it as prevalent (in *Zone 1*) at Sadiya, where indeed it is abundant in the grazed lands, and was found in fruit in November. (No. 35748 came from Makum which is beyond the area of this report).

Vangueria edulis, Vahl. Hook. f., Fl. Brit. Ind., iii, p. 136. A small fruit tree, native of Madagascar, and now cultivated about India, plentiful (in *Zone 1*) at Sadiya. Lorraine gives an Abor name for it as Som-kir which suggests the Assamese Kotkora.

Vangueria spinosa, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 136. A small tree, in distribution Indo-malaysian, not uncommon (in *Zone 1*) in open places about Sadiya, as it is in other parts of Assam.

Ixora acuminata, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 137. A large shrub, in distribution Assamese, which is not uncommon in parts of the Plains at the top of the Brahmaputra valley (e.g., Makum 35756), but was not obtained under the Abor Hills. In the Hills (*Zone 3*) it was got at Janakmukh,

and (*Zone 4*) Kebang, and on "Signal Hill" over Yambung at about 2,000 ft. or 610 m. Its flowers were found in November and to January.

Ixora subsessilis, Wall. Hook. f., Fl. Brit. Ind., iii, p. 139. A shrub, in distribution Assamo-burmese, and reaching Yunnan. Growing to about 2—3 m., it is common (in *Zone 1*) in the forest of the Plains at Kobo (35942, 35980, 37101). In the Hills (in *Zone 3*) it was found at Janakmukh (37125), in the Serpo valley at 1,100 ft. or 335 m. and at 1,600 ft. or 488 m. and up to Renging Camp at 2,100 ft. or 640 m. (36310, 36627), on the south face of Bapu at 3,600 ft. or 1,097 m., over the head waters of the Serpo and Igar at 5,500 ft. or 1,676 m. (36214), (in *Zone 4*) over Rotung at 3,700 ft. or 1,128 m. on a hill-crest (36235), and on the hill-top over Babuk at 3,600 ft. or 1,097 m. (37661). Some plants carried their dull red berries from November forward; others from December were producing their pretty pendent coral pink flowers; and so conspicuous was this difference, that in the field I thought that I had two species.

Coffea bengalensis, Roxb. Hook. f., Fl. Brit. Ind., iii, p. 153. A small bush, in distribution Himalayo-malaysian with an extension beyond the Bengal Plain into Chota-Nagpur. It is common (*Zone 1*) at Sadiya (*vide* Gammie in *Records Bot. Survey India*, i, p. 71). It makes a fair proportion of the undergrowth of the forest at Kobo (35995, 36798, 37073, 38105), and is plentiful (in *Zone 2*) about Pasighat. Within the Hills (in *Zone 3*) it is common at Janakmukh (36848), Balek, and Aieng (37232). Its fruits were found in December; its fragrant white flowers were very conspicuous at the end of February, coming with the new leaf, the old having just fallen.

Coffea khasiana, Hook. f., Fl. Brit. Ind., iii, p. 154. A half-sprawling shrub, in distribution Assamese, found in (*Zone 3*) on the south face of Bapu at 5,000 ft. or 1,524 m. (36920), and again upon the summit at 6,266 ft. or 1,910 m. (36933). It is believed that it was seen (in *Zone 4*) also over Rotung at 4,700 ft. or 1,433 m.; but the record is a little doubtful.

Damnacanthus indicus, Gaertn. Hook. f., Fl. Brit. Ind., iii, p. 158. A low growing shrub, in distribution Assamo-chinese, extending to Japan, found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36545), attaining 2.50 m. in height, but broad out of proportion to this, the flowers hanging under the branches.

Plectronia glabra, Benth. and Hook. f. *Canthium glabrum*, Blume. Hook. f., Fl. Brit. Ind., iii, p. 133. A small evergreen tree, in distribution Assamo-malaysian, found as a bush in *Zone 3* upon the east bank of the Dihang opposite Janakmukh (36466), and also at 5,500 ft. or 1,676 m. upon the water-parting between the Serpo and the Igar streams (36216), with fruits in January.

Psychotria fulva, Ham. Hook. f., Fl. Brit. Ind., iii, p. 169. A small shrub in distribution Assamo-burmese, the commonest of the low vegetation in the dense forests at the top of the Assam valley. It is very abundant (in *Zone 1*) at Sadiya (35787) and at Kobo (35914, 35930, 35957, 35983, 37032, 38111) and northwards (in *Zone 2*) through the Plains forest. In the Hills (in *Zone 3*) it was at Janakmukh and by the Rammidambang clearing in association with *Vatica Shingkeng*, in the *Talauma* forest upon the south side of Bapu at 3,500 ft. or 1,067 m. and in oak forest (in *Zone 4*) over Rotung at 3,900 ft. or 1,189 m. and at 4,700 ft. or 1,433 m. over Babuk.

It is heterophyllous. Between November and January its berries were ripe, passing from green to a purplish red.

Psychotria symplocifolia, Kurz. Hook. f., Fl. Brit. Ind., iii, p. 172. A small bush, in distribution Assamo-burmese, found in the oak forest (*Zone 3*) over Renging from 3,500 ft. to 4,400 ft. or 1,006 to 1,341 m. (36279) with its black berries ripe in January.

Psychotria denticulata, Wall. Hook. f., Fl. Brit. Ind., iii, p. 173. A small shrub, about 1 m. high, of deep shade, in distribution Assamo-burmese, extending westwards to Central Nepal and south-eastwards to Tenasserim. It was found (in *Zone 1*) at Kobo (37033) and at Pobamukh (37044); and (in *Zone 2*) from Pasighat to the foot of the Hills in association with *P. fulva*, but not so common as it. In the Hills (in *Zone 3*) again, though more common than in the Plains, it was still less common than *P. fulva*. At Janakmukh it occurs in the forest of *Vatica Shingkeng* (37306), in the Serpo valley, in the gorge of the Dihang above Renging, (in *Zone 4*) under Rotung (37351), and above Rotung to 3,800 ft. or 1,158 m., on the banks of the Dihang about Puak and Yambung, to 2,000 ft. or 610 m., over Babuk, (37667) and on various sides of Yambung. Near Kebang and near Rotung it was found among bushes being more exposed to sun than is usual.

Its berries go from yellow to red in December and January.

Psychotria calocarpa, Kurz. Hook. f., Fl. Brit. Ind., iii, p. 173. A small shrub, in distribution Assamo-burmese, with its limits in Central Nepal and Tenasserim. In *Zone 3* it is found over Balek in forest of *Vatica Shingkeng* from 2,000 ft. or 610 m. and in other forest to 3,000 ft. or 914 m., and also from Renging camp at 2,000 ft. or 610 m. up to 4,000 ft. or 1,219 m. on the hills over it. In *Zone 4* common in oak forest at 4,700 ft. or 1,433 m. over Rotung (unnumbered specimen), over Babuk at 3,800 ft. or 1,158 m. (37660) in oak forests.

Psychotria aborensis, Dunn in Kew Bull., 1920, p. 133. A shrub about 2 m. high, found in deep shade, endemic. It occurs in the Hills (in *Zone 3*)

in the bottom of the Serpo valley, and (in *Zone 4*) in deep shade in the gorge of the Dihang under Rotung (37601) near the Side stream, under Ponging, near the river Dihang by Yambung camp at 1,000 ft. or 305 m. (36006), and across the Dihang over the Libang (37730) stream and to 4,000 ft. or 1,219 m. over Pangl.

Psychotria sp. A shrub 2 m. high drying reddish, with leaves elliptic, acute below, acuminate above, in dimensions up to 14 by 6.5 cm., found in fruit (in *Zone 3*) in forest just below the summit of Bapu at 6,200 ft. or 1,890 m. (36556).

Psychotria sp. A tree about 20 m. high with wide horizontal branches, with leaves obovate, shortly acuminate, sparingly hirsute below, in dimensions up to 30 by 13 cm., and with a black berry 1.25 cm. in diameter found (in *Zone 4*) in the Lalik valley under trees twice as high, at 2,000 ft. or 610 m. (38166).

Chasalia lurida (Blume) Merrill. *C. curviflora*, Thw. Hook. f., Fl. Brit. Ind., iii, p. 176. A half-herbaceous shrub, in distribution Indo-malaysian, found in the Plains forest (in *Zone 1*) at Sadiya (35799) with its fruit ripening from red to black in November.

Lasianthus Biermanni, King ex Hook. f., Fl. Brit. Ind., iii, p. 190. A shrub in distribution Assamese, attaining 3.50 m. in height growing on hill-crests and on steep slopes in oak forest (in *Zone 3*) from 4,000 ft. or 1,219 m. over Renging camp at various altitudes (36284) to the top of Bapu at 6,266 ft. or 1,910 m., and in *Zone 4* at 3,900 ft. or 1,189 m. over Rotung (36549.) Its metallic blue fruits were ripe in January, at which time also its dull blue flowers appeared.

Lasianthus sp. A small shrub, .5 to 2 m. high, perhaps a new species, common (in *Zone 3*) over a limited area in the Hills as in forest north of Janakmukh (36856) where it associates with *Vatica Shingkeng*, in the Serpo valley (38144) on mixed forest, and at Renging (36638), and again above Renging camp at 2,400 ft. or 732 m. (36255). It carried purple buds in the end of January. The last (36255) differs by a little from the others.

Paederia foetida, Linn. Hook. f., Fl. Brit. Ind., iii, p. 195. A considerable herbaceous climber, in distribution Assamo-malaysian. In *Zone 1* collected by Griffith in January 1836 from Sadiya southwards. (*Notulae*, iv, p. 268.)

Paederia tomentosa, Blume. Hook. f., Fl. Brit. Ind., iii, p. 197. A nearly herbaceous climber, in distribution Assamo-malaysian found (in

Zone 1) growing into the branches of small trees at Sadiya (35775) and at Kobo (37424), in flower in November.

Rubia sikkimensis, Kurz. Hook. f., Fl. Brit. Ind., iii, p. 203. A herbaceous climber, in distribution Assamese, found in *Zone 3* upon one spot on the south face of Bapu at 4,800 ft. or 1,463 m. and (*Zone 4*) between the Igar valley and Rotung, in many spots plentifully between Rotung and Kalek, from 2,500 to 3,500 ft. or 762 to 1,067 m. (37565), at 3,600 ft. or 1,097 m. above Babuk. It was always sterile.

Galium triflorum, Michx., var. **Hoffmeisteri**, Hook. f., Fl. Brit. Ind., iii, p. 205. A small herb which occurs all round the World, found (in *Zone 4*) upon the rock of Kekar-Monying at 800 ft. or 244 m. at upper flood-limit of the Dihang (36140), in flower in January. Griffith (in *Trans. Agri-Hort. Soc. India*, V, 1838, p. 130) records a *Galium* as got at Sadiya.

Compositae.

Vernonia Roxburghii, Less. Hook. f., Fl. Brit. Ind., iii, p. 232. An undershrub, in distribution Indo-burmese or Himalayo-burmese (for its occurrence in the Konkan is doubtful, and its occurrence in Central India can be looked upon as an extension of its spread to Chota-Nagpur), found (in *Zone 3*) at Rammidambang (36422).

Vernonia cinerea, Less. Hook. f., Fl. Brit. Ind., iii, p. 233. A small herbaceous weed, distributed through the Tropics of the Old World and very common in India, altogether an opportunist in the Abor Hills, growing as an annual between flood-limits (in *Zones 3 and 4*) on the Dihang banks from Janakmukh (37479) to Yambung, in the months when the river is low, and springing up upon the clearings of the Abors about all the villages, and up to about 1,800 ft. or 549 m. (No. 36630 was collected near Renging camp, No. 36435 at Balek). It was particularly abundant upon the big Rammidambang clearing, and already in fruit in February. The Abor name of Ramdam was got for it.

Vernonia saligna, DC. Hook. f., Fl. Brit. Ind., iii, p. 235. A half-weedy herb, in distribution Assamo-burmese, and into southern China; it has its western limit in Central Nepal. It was found (in *Zone 3*) close to the Dihang north of Janakmukh (37310) bearing its lilac flowers in December, and (in *Zone 4*) on the clearings of Rotung.

Vernonia talaumacfolia, Hook. f. and Thoms. Hook. f., Fl. Brit. Ind., iii, p. 240. A small tree, in distribution Assamo-burmese. It was found

attaining a height of 8 m., with a diameter of stem at the base of 13 cm. (in *Zone 3*) at Janakmukh (37481) and between Rammidambang and the Serpo valley at 1,900 ft. or 579 m. (36388).

Vernonia volkameriaefolia, DC. Hook. f., Fl. Brit. Ind., iii, p. 240. A small tree, in distribution Assamo-burmese, found in the Abor Hills (in *Zone 4*) over Rotung on land showing indications of former clearing at 2,500 ft. or 762 m. (36221), and at 3,200 ft. or 975 m., also, and again upon the south-east side of Rotung (36824). It carried its big nodding panicles of lilac flowers in January, and was already in fruit in March.

Vernonia scandens, DC. Hook. f., Fl. Brit. Ind., iii, p. 241. A half-woody sprawler, in distribution Assamo-burmese, found in the hills (in *Zone 3*) upon the south face of Bapu at 4,800 ft. or 1,463 m., at Renging (36667), (in *Zone 4*) over the Igar at 3,000 ft. or 914 m., at Kalek at the same height (37569) in secondary forest, under Kebang village on the hill face towards the Dihang, and on the edge of the Pangi clearings at 4,000 ft. or 1,219 m. Its puce-coloured flowers with long-exserted yellow stigmas were produced in December.

Adenostemma lavenia, (Linn.) O. Kze. *A. viscosum*, Forst. Hook. f., Fl. Brit. Ind., iii, p. 242. A herbaceous weed, in distribution Pantropic. Griffith collected it (in *Zone 1*) at Sadiya in June 1836 (*Notulae*, i, p. 187), and I found it (in *Zone 3*) at Janakmukh and (in *Zone 4*) near Kalek between 3,000 and 3,800 ft. or 914 and 1,158 m. (37578).

Eupatorium Reevesii, Wall. Hook. f., Fl. Brit. Ind., iii, p. 243. A half-woody climber, in distribution Himalayo-chinese and to Japan, found (in *Zone 3*) at Janakmukh (37459).

Ageratum conyzoides, Linn. Hook. f., Fl. Brit. Ind., iii, p. 243. A herbaceous weed, in distribution Pantropic. A common weed (in *Zones 2, 3, and 4*) in all the clearings of the Abor villages visited, the commonest of all the weeds in the first year of their neglect, often completely covering the ground. In the lower Hills it appears to flower in all the months of the year, but least so in March. At that time in the Plains its abundance is restricted by much of the land having become too dry for it; and it is vigorous only in such spots as borrow-pits on roadsides. But in the Abor Hills no ground becomes too dry for it, and it was noticed often to be most plentiful where the slope afforded the extreme of drainage; but perhaps this abundance is connected in a greater measure with slower recovery of competing and ultimately suppressing shrubs after cropping than with moisture. It comes up below flood-limit on the banks of the Dihang.

It occurs in the Plains under as in the Hills, and was abundant (in *Zone 1*) on fairly recent clearings near Kobo, and seedlings came up all over the camp. The Abors called it Nam-shing. (Janakmukh, 37478.)

Dichrocephala latifolia, DC. Hook. f., Fl. Brit. Ind., iii, p. 245. A herbaceous weed, in distribution more or less through the Tropics of the Old World. It was plentiful upon the clearings (in *Zone 3*) of Balek, Rammidambang (37493), (in *Zone 4*) Rotung (37388) and Kalek (37571). The greatest altitude of these was 3,600 ft. or 1,097 m. It was in flower in December.

Microglossa volubilis, DC. Hook. f., Fl. Brit. Ind., iii, p. 257. A sprawling shrub, in distribution Assamo-malaysian, extending to China, a weed 3 m. high of the clearings (in *Zone 4*) of Rotung at 1,400 ft. or 427 m. (37254), with white flowers in December.

Conyza japonica, Less. Hook. f., Fl. Brit. Ind., iii, p. 258. An annual herb, in distribution Himalayo-chinese, extending to Japan. A weed in *Zone 1* in the Plains found on the Kemi chapri confined to one bushy spot (38117), and on the clearings in the Abor Hills, found (*Zone 3*) at Rammidambang at 1,000 ft. or 305 m. (36389) and (*Zone 4*) at Kalek at 3,600 ft. or 1,097 m. (37563).

Conyza viscidula, Wall. Hook. f., Fl. Brit. Ind., iii, p. 258. A tall herb, in distribution Indo-malaysian, and extending to Australia. A weed of clearings in the Hills and of sunny spots generally (in *Zone 3*) from Janakmukh (37203, 37480) to (*Zone 4*) Rotung (37534) and on to Pangli, ascending to 2,500 ft. or 762 m. over Rotung. Its pink upright flowers were observed from December to February.

Blumea glomerata, DC. Hook. f., Fl. Brit. Ind., iii, p. 262. A herb in distribution as *Vernonia Roxburghii* somewhat; if it really occurs in the Konkan it is Indo-malaysian, but if it does not, then its westward extension to Pachmari may be passed over as an extension of its Chota-Nagpur area, and it be regarded in the main as Himalayo-malaysian. It was found (in *Zone 3*) as a weed on the clearing of Rammidambang (36402, 38145), in flower in February, the flowers mostly horizontal.

Blumea lacera, DC. Hook. f., Fl. Brit. Ind., iii, p. 263. A rather small herb, in distribution wide in the Old World, as regards Asia, Indo-malaysian and through the warmer parts of China; occurring (in *Zone 2*) as a very common weed upon the clearings below Balek towards Lokpur (36996) and (in *Zone 3*) at Rammidambang (36417, 38147). Its flowers nod.

Blumea macrostachya, DC. *B. hieracifolia*, var. *macrostachya*, Hook. f., Fl. Brit. Ind., iii, p. 263. A tall herb, in distribution Assamese, found (in *Zone 1*) at Kobo (37409).

Blumea laciniata, DC. Hook. f., Fl. Brit. Ind., iii, p. 264. A herb of moderate size, in distribution Indo-malaysian, and in China; a weed (in *Zone 3*) of the Rammidambang clearing (36414).

Blumea membranacea, DC. Hook. f., Fl. Brit. Ind., iii, p. 265. A herb in distribution Indo-malaysian, found in the variety *sub-simplex* (in *Zone 1*) near the Brahmaputra banks at Sadiya (32681) and on the Dihang banks (in *Zones 3 and 4*) rather below extreme flood-level at Janakmukh (37133), under Ponging and at Yambung.

Blumea procera, DC. Hook. f., Fl. Brit. Ind., iii, p. 268. A rather tall herb, in distribution Assamo-burmese, extending westwards to Central Nepal; found (in *Zone 3*) on the clearings of Rammidambang (36406) and (in *Zone 4*) Rotung (38178). At Rotung as the season when *Ageratum* is at its best passes, this *Blumea* comes into flower. Its flowers are directed obliquely downwards.

Blumea myriocephala, DC. Hook. f., Fl. Brit. Ind., iii, p. 269. A rather large herb, almost a shrub, in distribution Assamo-burmese, and in the islands off the Chinese coast, found (in *Zone 1*) at Pobamukh (38229) and (in *Zone 3*) upon the clearings of Rammidambang (38143). It has nodding yellow flowers.

Blumea densiflora, DC. Hook. f., Fl. Brit. Ind., iii, p. 269. A rather stout herb, in distribution Assamo-malaysian, and into Polynesia, found (in *Zone 3*) as a weed upon the clearings of Rammidambang (36401).

Blumea aromatica, DC. Hook. f., Fl. Brit. Ind., iii, p. 270. A large herb, almost shrubby, in distribution Himalayo-malaysian and in China, found in the Plains near Pasighat (37435), and in the Hills (*Zone 3*) at Janakmukh (37477) and (*Zone 1*) in shade over the mouth of the Yamne river at 1,400 ft. or 427 m. (36157).

Blumea balsamifera, DC. Hook. f., Fl. Brit. Ind., iii, p. 270. A tall plant mostly herbaceous, but woody below, in distribution Assamo-malaysian, and in the islands off China. A coarse weed of clearings at a stage in re-afforestation when they are covered with bushes, and as small plants on newer clearings, common (in *Zones 1, 2, 3 and 4*) up to 2,100 ft. or 640 m. from Kobo (36790) to Yambung. At Janakmukh in December it carried its newly produced flower somewhat downwardly directed (37244).

Anaphalis araneosa, DC. Hook. f., Fl. Brit. Ind., iii, p. 283. A somewhat woody herb, in distribution Indo-burmese, found (in *Zone 4*) at 3,400 ft. or 1,036 m. at the top of the clearings of Babuk village (37652) and at about 2,000 ft. or 610 m. on a clearing near Ponging.

Gnaphalium luteo-album, Linn. Hook. f., Fl. Brit. Ind., iii, p. 288. A herb, in distribution through the Tropics and the Sub-tropics, a weed of clearings in the Abor Hills, very common and general but in the Plains (in *Zone 1*) only as an opportunist on the river bank at Kobo (36782) below flood-level. In the hills it occurred (in *Zones 3 and 4*) from Rammidambang to Babuk, and ascended to 2,000 ft. or 610 m. at Renging camp (36730), and Kalek. It was in flower in the Hills from December; but at Kobo flowered much later in consequence of the plant being unable to establish itself until the fall of the river in November.

Gnaphalium purpureum, Linn. Hook. f., Fl. Brit. Ind., iii, p. 289. An American herb, which has been in Northern India for some time, found (in *Zone 3*) in plenty upon the clearing of Rammidambang at 1,000 ft. or 305 m. (36390) in flower in January.

Xanthium Strumarium, Linn. Hook. f., Fl. Brit. Ind., iii, p. 303. A coarse herb, in distribution Pantropic, found (in *Zone 1*) by Griffith at Sadiya in June 1836 (*Notulae*, i, p. 192).

Siegesbeckia orientalis, Linn. Hook. f., Fl. Brit. Ind., iii, p. 304. A herb, in distribution Pantropic, a weed easily found (in *Zone 1*) upon the bank of the Brahmaputra at Kobo (36787) and in the village of Balek (36445). Griffith further seems to have got it at Sadiya (*Notulae*, i, p. 193). The Abors call it Tang-um.

Spilanthes Acmella, Linn. Hook. f., Fl. Brit. Ind., iii, p. 307. A herb, in distribution Pantropic, a weed of clearings (in *Zone 3*) found at Balek at 1,400 ft. or 427 m., on the clearing of Rammidambang (37494) and (in *Zone 4*), in plenty upon the clearings of Kalek at 3,600 ft. or 1,097 m. (37572), about Pangi village (37768) as well as above it, and on a clearing over the Libang stream (37745). Griffith probably refers to this species when he records a *Spilanthes* as occurring at Sadiya (*Notulae*, i, p. 193).

Bidens pilosa, Linn. Hook. f., Fl. Brit. Ind., iii, p. 309. A herb, in distribution Pantropic, a common weed in clearings (in *Zones 1, 3 and 4*) about Kobo (36777, 37429), Pobamukh, Renging, Rotung, and Ponging ascending to 2,100 ft. or 640 m.

Artemisia vulgaris, Linn. Hook. f., Fl. Brit. Ind., iii, p. 325. A half-woody herb, in distribution from Europe to Malaya. The permanently open places that this species needs are rare in the Abor Hills but it finds (in *Zone 1*) what suits it in the grazing land at Sadiya, and is there very abundant, as also at Saikhoa. In the Hills it was observed (in *Zone 4*) at the mouth of the Sireng river, and at Ponging, at 2,300 ft. or 701 m. Gammie (*Records Bot. Survey India*, 1, p. 71) recorded it as a Sadiya plant.

Gynura angulosa, DC. Hook. f., Fl. Brit. Ind., iii, p. 334. A tall herb, in distribution Indo-burmese, found (in *Zone 1*) on the pathside at Kobo (35970), (in *Zone 4*) on the clearings of Rotung, and also on clearings over the Libang stream at 2,000 ft. or 610 m. (37746). It was in flower in December and January.

Gynura sarmentosa, DC. Hook. f., Fl. Brit. Ind., iii, p. 335. A half-woody sprawler, in distribution Assamo-malaysian, found (in *Zone 1*) growing to 2 m. among bushes at Kobo (37004), a considerable extension of its known range.

Emilia sonchifolia, DC. Hook. f., Fl. Brit. Ind., iii, p. 336. A small herb, in distribution through the Tropics of the Old World and introduced into America. It was found in the Plains (in *Zone 1*) on the edge of the Kemi chapri. In the Abor Hills it appeared to be rather uncommon; it was found (in *Zone 3*) on the clearings of Rammidambang (36415) and (in *Zone 4*) on these of Pangi.

Senecio Walkeri, Arn. *S. araneosus*, DC. Hook. f., Fl. Brit. Ind., iii, p. 361. A somewhat woody climber, in distribution Indo-malaysian. It was found (in *Zone 3*) upon a "razor-edge" ridge on the south face of Bapu at 4,400 ft. or 1,341 m. (36914), the ridge being so steep that forest can not close over it; and (in *Zone 4*) in the Side valley at 900 ft. or 274 m. (36064), lying over bushes which arched over the stream.

Senecio scandens, Don. Hook. f., Fl. Brit. Ind., iii, p. 352. A sprawler, in distribution Indo-chinese and to Tonkin. It was found (in *Zone 4*) at Kalek at about 3,000 ft. or 914 m. (37575) with its yellow flowers open in the end of December.

Senecio trilingulatus, Ham. Hook. f., Fl. Brit. Ind., iii, p. 356. A sprawler, in distribution Assamo-Burmese with its western limit in Central Nepal, found (in *Zone 4*) at 3,000 ft. or 914 m. among bushes near the crest, and among oak trees on the crest of the hills immediately south of Rotung (36230). Its mustard-yellow flowers were open in January.

Saussurea affinis, Spreng. Hook. f., Fl. Brit. Ind., iii, p. 373. An annual herb, in distribution Assamo-chinese and in Japan, its western limit in Central Nepal, found (in *Zone 1*) at Kobo (36775).

Ainsliaea pteropoda, DC. Hook. f., Fl. Brit. Ind., iii, p. 388. A herb usually of grassy places, in distribution Himalayo-burmese, found (in *Zone 3*) upon the summit of Bapu at the very edge of the cliff at 6,266 ft. or 1,910 m. (36552), in very restricted quantity and appearing out of place.

Crepis japonica, Benth. Hook. f., Fl. Brit. Ind., iii, p. 395. An annual herb, in distribution in Mauritius and in Asia from Afghanistan to the China Sea, common from the plains (*Zone 1*) at Kobo (36793) (through *Zones 2 and 3*) on clearings into the Hills as far as exploration was undertaken, abundant (in *Zone 4*) on the clearings of Rotung (37554), Ponging, Kalek and Pangi up to 4,000 ft. or 1,219 m. and also upon the river bank just about flood-limit from Yambung downwards to Janakmukh (37148). It came into flower in December.

Lactuca brevirostris, Champ. Hook. f., Fl. Brit. Ind., iii, p. 405. *L. bialata*, Griffith, Notulae, iv, p. 247. A tall annual herb of grassland, in distribution Assamo-malaysian and through China to Japan. Griffith collected it (in *Zone 1*) at Sadiya in 1836, and records that the latex was dried as a substitute for opium. I found it in August 1909 near the Diphu guard east of Sadiya in a stretch of tall *Saccharum* (32663) and also to the south-west of Sadiya. It has pale yellow flowers which were observed to open at 9-30 in the morning.

Lactuca polycephala, Benth. Hook. f., Fl. Brit. Ind., iii, p. 410. An annual herb, in distribution approaching Himalayo-burmese. It takes advantage of the winter fall of the rivers to grow below flood-level, and was found on the bank of the Brahmaputra (in *Zone 1*) at Kobo (36791) and at Pobamukh, flowering in March.

Lactuca gracilis, DC. Hook. f., Fl. Brit. Ind., iii, p. 410. A herb, perennial in its peculiar habitat, in distribution Himalayo-burmese. It grew firmly fixed in crannies of the rocks of the bed of the river Dibang towards upper flood-limit (in *Zone 3*) at Janakmukh, and (in *Zone 4*) from Yambung to Rotung (37373, 37508) flowering in December and forward to February.

Prenanthes scandens, Hook. f. and Thoms. Hook. f., Fl. Brit. Ind., iii, p. 413. A half-woody sprawler, in distribution Assamese, found (in *Zone 4*) in the hills south of Rotung at 3,600 ft. or 1,099 m. (36232) and at Kalek at 3,400 ft. or 1,036 m. (37581), with dull magenta slightly drooping flowers in December and on to February.

Sonchus arvensis, Linn. Hook. f., Fl. Brit. Ind., iii, p. 414. A herb, in distribution through all the temperate and much of the tropical part of the world, found (in *Zone 3*) upon river shingle at Janakmukh (37490), and on the clearings at Rammidambang and (in *Zone 4*) on the river shingle under Ponging and on the clearings of Ponging (36146). It flowers in January.

Campanulaceae.

Pratia Nummularia, (Lamk.) Kurz. *P. begoniifolia*, Lindl. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 422. A small herb, in distribution Assamo-malaysian, and in south China. It was found (in *Zone 4*) close to the river-bank near Puak at 900 ft. or 274 m. (37640) as well as upon the clearings of Babuk at 2,300 ft. or 701 m. and above Pangi at 4,000 ft. or 1,219 m.

Pratia montana, Hassk. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 423. A tall herb, in distribution Assamo-malaysian, with its western limit in Central Nepal, found (in *Zone 3*) on a pathside on the north face of Bapu at 5,700 ft. or 1,737 m. (36988), attaining 75 m. in height, and in March bearing its brilliantly violet fruit.

Lobelia affinis, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 424. A herb, in distribution Indo-malaysian, requiring sun, and growing in Aborland upon pathsides. It was found in the Plains (*Zone 2*) at Pasighat plentifully and below the village of Balek towards Lokpur. In the Hills it was got (in *Zone 3*) at Janakmukh (36514) at about 1,000 ft. or 305 m., and on the south face of Bapu at 2,000 ft. or 610 m. (36954), in the Serpo valley (in *Zone 4*) at Rotung, and between Kebang and the river Dihang from 900 to 2,100 ft. or 274 to 640 m. (37792). It was in flower in January: and over Babuk a race with flowers fading fawn-coloured was observed.

Campanumaca javanica, Blume. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 435. A climbing perennial herb, in distribution Assamo-malaysian found once only, (in *Zone 4*) at Kalek at 3,400 ft. or 1,036 m. (37574).

Campanumaca parviflora, Benth. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 437. A perennial herb, in distribution Assamo-burmese. I did not observe it in the Plains; but it is probable that it is the *Cyclocodon* of Griffith's *Journal*, i, p. 21, which he got upon the Mishmi-Hill-side of Sadiya. In the Hills (*Zone 3*) it was found at Janakmukh on the under cliff of the Dihang bank in places almost clear of other vegetation, and on the shingle of the Janak stream (37207). It was found also (in *Zone 4*) close to Rotung at 1,000 ft. or 305 m. (37608) with its white pendent berries ripe in December.

Campanumaea sp. A herbaceous climber found only (in *Zone 3*) near Renging camp (36724).

Campanula cana, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 440. A herb, in distribution Himalayan, got by Griffith (in *Zone 1*) in sandy fields at Saikhoa, as well as further down the Brahmaputra banks. He obtained it also in the Mishmi hills.

Vacciniaceae.

Agapetes setigera, D. Don. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 443. A woody epiphyte, in distribution Assamo-burmese, but not yet found so far west as Sikkim. It was found (in *Zone 3*) in high forest on the Hills, on Bapu over Balek at 2,100 ft. or 640 m. and from 2,500 to 3,000 ft. or 762 to 914 m., common, and common in the Serpo valley above 1,500 ft. or 457 m. (36382) to Renging camp at 2,300 ft. or 701 m. (36250, 36639), and on the hill above Renging at 4,200 ft. or 1,280 m. (36302). It was in flower from January to March, with dark crimson flowers.

Agapetes grandiflora, Hook. f. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 446. A woody epiphyte, in distribution Assamo-burmese, found in the high forest (in *Zone 3*) on the edge of the Hills at Janakmukh (37193, 37464), and on the spurs over Renging camp, and (in *Zone 4*) over the Igar stream up to 4,200 ft. or 1,280 m., apparently abundant. It flowered in December and January, its bells being of two shades of carmine with the lobes emerald; the short racemes are produced from the old wood.

Agapetes nutans, Dunn in Kew Bull., 1920, p. 134. A woody epiphyte, endemic, found in the high forest (in *Zone 3*) on a "razor-edge" ridge between the Serpo and Lalik streams at 5,100 ft. or 1,554 m. (36347) in association with *Agapetes marginata*, flowering in January, the bells crimson with the lobes green tipped.

Agapetes marginata, Dunn in Kew Bull., 1920, p. 133. A woody epiphyte, endemic, found (in *Zone 3*) in the oak forest above Renging camp at 3,800 and at 5,100 ft. or 1,554 m. (36340) flowering in January from its thicker stems.

Agapetes angulata, Hook. f. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 447. An endemic shrub 2.5 m. high with very dark foliage, found (in *Zone 3*) on a "razor-edge" ridge at 5,100 ft. or 1,554 m. on the water-parting between the Serpo and Lalik streams (36349).

Vaccinium sp. near *V. Nummularia*, Hook. f., and Thoms. An epiphyte found (in *Zone 4*) on the edge of the swamp of Ripshing Sieng at 5,500 ft. or 1,676 m. (36976), differing from *V. Nummularia* in its obtuse leaves and longer calyx-lobes. It was in flower in March.

Vaccinium venosum, Wight. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 452. A woody epiphyte or sometimes on rocks, in distribution Assamese, found (in *Zone 3*) on the summit of Bapu at 6,266 ft. or 1,910 m. (36927), and (in *Zone 4*) in oak forest above Rotung at 4,500 ft. or 1,372 m. (38200) flowering in March and April.

Ericaceae.

Pieris ovalifolia, D. Don. C. B. Clarke in Hook. f., Fl. Brit. Ind. iii, p. 460. A deciduous small tree, in distribution Himalayo-chinese, extending to Japan, in the Sikkim Himalaya associating with *Rhododendrons* at 10,000 ft. or 3,048 m. and so also in the North-west Himalaya, and again in Sikkim associating with *Shorea* as low as 2,000 ft. or 610 m. *Shorea* and *Pieris* at a low elevation appear alike absent from the Abor Himalaya : but *Pieris ovalifolia* was got (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. and upon a "razor-edge" ridge on the water-parting between the Serpo and the Lalik at 5,100 ft. or 1,554 m. (36362).

Rhododendron calophyllum, Nutt. *R. Maddeni*, var. *calophyllum*, C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 473. A shrub, in distribution Assamese, found flowerless only, so that there is a small element of uncertainty in the determination which arises from the great similarity of the foliage of *R. calophyllum* to that of *R. Maddeni*. It was got (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36941) and on two rocky ribs, "razor-edge" ridges, on the water-parting between the valleys of the Serpo and the Lalik at about 5,100 ft. or 1,554 m. (36346).

Whether this *Rhododendron* or another, was the one found in plenty by Major Sweet's exploring party at 9,000 ft. or 2,743 m. and above, with Conifers, on the peak immediately north of Damroh, cannot be said.

Plumbaginaceae.

Plumbago zeylanica, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 480. A half-woody herb, in distribution through the Tropics of the Old World, occurring (in *Zone 1*) in the village of Sadiya, probably from cultivation (35903), in flower in November.

Primulaceae.

Lysimachia japonica, Thunb. Hook. f., Fl. Brit. Ind., iii, p. 505. A herb, in distribution Himalayo-malaysian and through China to Japan, found (in *Zone 4*) in the swamp of Ripshing Sieng at 5,500 ft. or 1,676 m. sparingly (36984).

Griffith recorded a *Lysimachia* as a Sadiya plant (in *Trans. Agri. Hort. Soc., India*, V, 1838, p. 129) which probably was this species.

Myrsinaceae.

Maesa ramentacea, A. DC. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 508. A shrub, in distribution Assamo-malaysian, found (in *Zone 3*) at 1,700 ft. or 518 m. at Balek (36893), with horizontal flowers in March.

Maesa sp., obviously a new species, a shrub, found (in *Zone 4*) by the Dihang river between Yambung and Puak at 900 ft. or 274 m. (37681), in fruit in January. It has large ovate curiously dentate leaves 44 by 10 cm., the teeth standing almost at right angles to the leaf-blade, the margin turned under everywhere even on the sides of the teeth whereby their abruptness is increased: the lateral nerves are numerous, and diverge from the midrib at a large angle; the panicle is half as long as the leaf.

Maesa indica, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 509. A shrub or small tree, in distribution Indo-malaysian, and in Yunnan. It is fairly common (in *Zone 1*) at Kobo (35960) where its last whitish fruits were on the branches in November. In the Hills (in *Zones 3 and 4*) it is to be found in any place where the forest covering has suffered interference, especially in the 4—5 m. high scrub which occupies clearings in a certain condition; on such near Yambung it had *Solanum indicum* as a very common associate. It ascends to 3,000 ft. or 914 m.

It was in fruit in December in the Hills, and immediately afterwards came again into flower. (No. 37253 was from Janakmukh; Nos. 36464, 37229, and 37240 from between Janakmukh and Aieng, Nos. 36634 and 36706 from Renging). No. 36464 is the variety *angustifolia*.

Maesa permollis, Kurz. *M. mollis.*, C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 510. A considerable shrub, in distribution Assamo-burmese-malayan, and reaching Yunnan. It was found (in *Zone 3*) at Janakmukh (36473, 37142), at Renging camp (36707), (in *Zone 4*) at Ponging in plenty, and in oak forest above the head of the Igar stream not uncommonly to 4,000 ft. or 1,219 m. (36187). It was in fruit in December.

Embelia ribes, Burm. C. B. Clarke in Hook f., Fl. Brit. Ind., iii, p. 513. A shrub, in distribution Indo-malaysian, and in China. It owes its place in the Abor Hills chiefly to man, growing on the edge of forest into his clearings, or about the clearings. It was found (in *Zones 3 and 4*) from 1,500 ft. or 457 m. at Balek (36576) to 4,000 ft. or 1,219 m. above Pangl (37771). Its small pale green flowers were produced in March. The Abors called it Tashi-reng. (No. 36637 was collected at Renging camp.)

Embelia parviflora, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 515. A sprawling shrub attaining rather over 3 m. in height, in distribution Assamo-burmese, now first recorded for the Himalaya. It needs light and was found (in *Zone 3*) at 3,600 ft. or 1,097 m. on the water-parting between the Serpo and the Igar, at 5,500 ft. or 1,676 m. on the edge of the marsh Ripshing Sieng (36981), at 2,100 ft. or 640 m. (in *Zone 4*) in disturbed forest near Kebang (37798). The flowers are produced under the down-arching branches and were found in January.

Sadiria Griffithii, Mez. *Pimelandra Griffithii*, C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 531. A small shrub, in distribution Assamo-burmese. It was found (in *Zone 3*) in the oak forest at Renging (36657) and above at 3,300 ft. or 1,006 m. (36272), (in *Zone 4*) above Upper Rotung at 3,600 and at 4,800 ft. *i.e.*, 1,097 and 1,463 m. (36220); and in all these places it carried its whitish berries under the horizontal branches in January and February. But above the Igar at 4,000 ft. it was got with very bright red berries (36188).

Sadiria Boweri, Dunn in Kew Bull. 1920, p. 111. A half-herbaceous shrub found (in *Zone 3*) at 6,266 ft. or 1,910 m. upon the summit of Bapu (36929), with very pale salmon flowers in March facing earthwards.

Ardisia virens, Kurz. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 524. A small shrub, in distribution Assamo-malaysian. It attains a height of 3 m. (in *Zone 1*) growing under small trees on the edge of the Kemi chapri (35958), and (in *Zone 3*) at 2,000 ft. or 610 m. above Balek upon the south slope of Bapu (36571). Its fruits go from a dirty flesh-colour to claret and were found hanging below the foliage in the month of December.

Ardisia Thomsonii, Mez in Engl. Pflanzenwelt, iv-236, 1902, p. 133. *A. khasiana*, var. *Thomsoni*, C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 527. A small shrub in distribution Assamese, found (in *Zone 3*) at Renging camp or 2,400 ft. or 732 m. (37318), with pale-cherry-coloured berries in the month of December.

Ardisia rhynchophylla. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 529. A small shrub, in distribution Assamese. It grows to about 1 m. in height and seems to prefer broken forest at low levels, being found (in Zones 3 and 4) chiefly along the course of the Dihang from Janakmukh (37146) to Yambung. Above Yambung it was found close to Kebang at 2,100 ft. or 640 m.,— its highest. Upon the east side of the Dihang it was got between Yambung and Sissin (36021). In January it carried magenta flowers, and also cherry-coloured berries at the ends of its horizontal or slightly ascending branches.

Ardisia sp. A meagrely branched shrub, 1·5 to 2 m. high, in forest, with lanceolate leaves, 15 by 2·25 cm. in dimensions, the margin at about each centimetre with a rather large but in no way prominent gland, the lower surface freely sprinkled with black; the berries are from cherry red to purple, and are in diameter 8 mm. It is quite plentiful in the Abor Hills (in Zone 3), in forest of *Vatica Shingkeng* near Rammidambang, at 4,500 ft. or 1,372 m. on the south face of Bapu, and in oak forest extending to the summit at 6,266 ft. or 1,910 m. (36935), at Renging camp at 2,400 ft. or 732 m. (36251), and above it at 4,400 ft. or 1,341 m. (36292) and upon a crest like the top of Bapu but at 4,100 ft. or 1,280 m. and (in Zone 4) upon a crest over Rotung at 3,900 ft. or 1,139 m. common under oak trees. It was in fruit in January and forwards.

Ardisia sp. A plant very like the last (36935) but with larger leaves, 26 by 8 cm. in dimensions; these leaves have similar glands. It was found (in Zone 4) at 900 ft. or 274 m. by the Side stream (36063), with flowerbuds in January.

Ardisia sp. A species with leaves elliptic, 17 by 4·5 cm. in dimensions, acuminate, with glands that are scarcely evident. It carried flower-buds in the end of February, these 5 mm. long, blunt above, and the calyx 2 mm. long. It was found (in Zone 3) at Renging (36687).

Ardisia near *A. yunnanensis*, Mez. A shrub growing erect, with horizontal branches, found (in Zone 3) upon the south slopes of Bapu at 3,500 ft. or 1,067 m. (36526), and again (in Zone 4) very common over Rotung about 4,700 ft. or 1,433 m. (36807), in flower in the end of January and in February.

Ardisia sp. with the habit of *A. oxyphylla*, Wall., the leaves 12 by 2·5 cm. in dimensions, the branches numerous, and the buds just mucronulate. It is a common plant (in Zone 2) in the beds of *Phragmites* on the old clearings under Balek (36994).

Amblyanthopsis membranacea, Mez. *Ardisia membranacea*, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 527. A small shrub, in distribu-

tion Assamese, growing in shade (in *Zone 3*) at about 900 ft. or 274 m. just within the Hills at Janakmukh (37276), and (in *Zone 4*) to the west of the mouth of the Yamne river, again on the bank of the Dihang between Puak and at the mouth of the Side stream (36131). The berries vary from holly red to a pink with brown flecks.

Sapotaceae.

Sarcosperma arboreum, Benth. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 535. A tall tree, in distribution Assamo-burmese (in *Zone 3*) found at Janakmukh (36477) and at Renging (36712).

Bassia butyracoides, B. N. Scott in Kew Bull., 1916, p. 36. A small endemic tree, common in the forests (in *Zone 3*) at Renging (36605) from the bottom of the Serpo valley to at least 3,700 ft. or 1,128 m. It occurs on Bapu over Balek at 2,500—2,700 ft. or 762—823 m. It descends to the level of the plains, but does not extend into the Plains. Nizamghat whence it was described is at their edge. It was found (in *Zone 4*) at 800 ft. or 244 m. opposite Rotung (37509) on the east (here north) bank of the Dihang, and to 3,800 ft. or 1,158 m. on the hills above Rotung. It was found over the mouth of the Yamne river (36162). It flowers profusely in January, its pale yellow petals littering the ground about Renging; and it changes its leaves after flowering. It is called Pai by the Balek Abors.

Ebenaceae.

Diospyros sp. with globose fruits similar to those of *D. sylvatica*, Roxb., which species, however, it can scarcely be, (in *Zone 3*) found on the summit of Bapu at 6,266 ft. or 1,910 m. (36942). The tree had been felled for the work of the Trigonometrical Survey, and leaves were no longer procurable, when it was observed.

Diospyros sp. Except that the leaves are a trifle smaller, an exact match in foliage of the Malayan *D. spiculata* Hiern., but entirely different in its brown seeds which are 2—3 times as long. A very common small tree (in *Zone 3*) attaining about 5 m. in height, always present in forest of *Vatica Shingkeng*, and frequently in forests of other types, not found south of Janakmukh (37246) or Balek, ascending Bapu above Balek to 4,000 ft. or 1,219 m., and then occurring under oaks, present in the bottom of the Serpo valley and thence upwards to 3,500 ft. above Renging (36636) under *Vatica*, oaks or *Engelhardtia*. The Abors call it Shin-ka.

It could not be found in the Plains forests.

Styracaceae.

Symplocos spicata, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 573. A tree of medium size, in distribution Indo-malaysian, and through China to Japan. It is not uncommon (in *Zone 1*) near Saikhoa, as a tree 7 m. high (23607) and also at Sadiya, from which place Gammie has already reported it (*Records Bot. Survey India*, i, p. 71).

Symplocos javanica, (Blume) Kurz. *S. ferruginea*, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 574. A tree of small size, in distribution Himalayo-malaysian, found in well drained places associated with *Terminalia myriocarpa*, (in *Zone 3*) at 2,300 ft. or 701 m. on the south face of Bapu above Balek (36902), and (in *Zone 4*) on a spur between Kebang and the river Dihang at 1,500 ft. or 457 m. (37791).

The Bapu plant is assignable to the var. *polystachya*.

Symplocos glomerata, King. C. B. Clarke in Hook. f., Fl. Brit. Ind., ii, p. 577. A small tree, in distribution Assamo-burmese, extending to Tonkin, found (in *Zone 3*) attaining a height of 3.5 m. upon the summit of Bapu at 6,266 ft. or 1,909 m. (36551). It was conspicuous for the darkness of its leaves.

Symplocos Hookeri. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 578. A small evergreen tree, in distribution Assamo-burmese, found (in *Zone 3*) at Renging camp at 2,000 ft. or 610 m. (36329, 36669), with new leaves in January.

Styrax serrulatum, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 588. A small tree, in distribution Assamo-chinese with an extension across the Bengal plain in Mayurbhanj, and reaching Japan across China. It attains 10 m. in height, in the forest from the edge of the Plains (in *Zone 2*) between Pasighat and (in *Zone 3*) Balek (36875) to (*Zone 4*) "Signal Hill" over Yambung (37711) and to 3,600 ft. or 1,097 m. over the Igar stream (36175), flowering with white downwardly directed flowers in March.

Griffith's *Styrax* from Sadiya (*Notulae*, i, p. 190) is not determinable from his writings.

Parastyrax Lacei, W. W. Smith in Notes Roy. Bot. Gard. Edinb., xii, 1920, p. 222. *Styrax Lacei*, W. W. Smith in Kew Bull. 1911, p. 344. A big tree attaining a height of 50 m. with a girth at breast-height of 7 m., in distribution narrowly Assamo-burmese. It is not uncommon (in *Zone 3*) about Renging camp (36737, 37316), (in *Zone 4*) over Upper Rotung at 3,100 ft. or 945 m. (38190) and upwards to 4,700 ft. or 1,433 m. It flowered profusely in

March, so plentifully that the fallen parts littered the ground : these flowers are sweet-scented, and in colour greenish cream ; they are produced rather below the horizontal leaves.

Styrax sp. A tree with leaves ovate-elliptic characteristically long-acuminate, in dimensions 12 by 4.5 cm., found sterile (*Zone 4*) upon the crest of the hill south of Rotung at 4,700 ft. or 1,433 m. (36816).

Oleaceae.

Jasminum undulatum, Ker. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 592. A woody climber, in distribution Assamo-chinese (in *Zone 1*) in the Plains at Sadiya, and on the edge of the Kemi chapri, in flower in November and December. (No. 35766, authenticating these records, is from Makum.)

Jasminum coarctatum, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 593. A woody climber, in distribution Assamo-burmese, found (in *Zone 2*) at Pasighat (36862), bearing its white flowers in January.

Jasminum anastomosans, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 596. A woody climber, in distribution Assamo-burmese, but absent from Sikkim, found in the Plains (in *Zones 1 and 2*) plentifully at Kobo (38102), Lokpur, Pasighat, and just into the Hills (in *Zone 3*) to Janakmukh where however it was equally plentiful. It flowers in February and March.

Jasminum flexile, var. *ovatum*, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 601. A woody sprawler, in distribution as regards the variety Assamese, but the type is in Southern India. It was found (in *Zones 1 and 2*) in the Plains forest at Kobo (35927), Pasighat (37450), and (in *Zone 3*) just within the Hills at Janakmukh. Possibly it extends further to Rotung. It flowered in December, at the same time carrying new bronzed foliage.

Linociera terniflora, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 610. A tree of medium size, in distribution Assamo-burmese, found (in *Zone 3*) at Janakmukh (37252), and doubtless the *Chionanthus terniflorus* of Griffith (*Notulae*, iv, p. 740) from Sadiya in April 1836.

Linociera macrophylla, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 610. A tree of medium size, in distribution Assamo-burmese, (as to *Zone 1*) "one of the prevalent small trees of Sadiya" (Gammie in *Records Bot. Survey India*, i, p. 71), (in *Zone 2*) not uncommon at Pasighat (36751) or (in *Zone 3*) Janakmukh (36853) and at Renging (36607).

Olea dioica, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 612. A tree of medium size, in distribution Indo-burmese, (in *Zone 1*) found at Kobo (36786).

Ligustrum robustum, Blume. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 614. A small tree of unusual distribution, but on the whole Assamo-malaysian and in China, (in *Zone 1*) found at Sadiya (32684).

Myxopyrum smilacifolium, Blume. C. B. Clarke in Hook. f., Fl. Brit. Ind., iii, p. 618. A large woody sprawler, in distribution Indo-malaysian. For *Zone 1* recorded by Griffith as at Sadiya (*Trans Agri-Hort. Soc. India*, v, 1838, p. 132) and also by Gammie (*Records, Bot. Survey India*, i, p. 71), found at Pobamukh (37042), and in the Hills (in *Zone 3*) commonly at Janakmukh (37249), between Janakmukh and Aieng (37235), on the Janak stream (37293) and (in *Zone 4*) over the mouth of the Yamne and at Rotung at 1,300 ft. or 396 m. (36087). Its bright orange berries were ripe in January.

Apocynaceæ.

Melodinus monogynus, Roxb. Hook. f., Fl. Brit. Ind. iii, p. 629. A large climber, in distribution Assamo-malaysian, and extending to China, found (in *Zone 4*) in oak forest at 3,900 ft. above Upper Rotung (38196).

Rauvolfia serpentina, Benth. Hook. f., Fl. Brit. Ind. iii, p. 632. A small shrub, in distribution Indo-malaysian, found (in *Zone 1*) at Sadiya.

Alyxia sp. A weak half-sprawling bush, found in several places in the Abor Hills, in fruit, and as to foliage an exact match of the Malayan *A. Forbesii*, King and Gamble. It grows on steep spurs, and there attains 10 m. in height. It was found (in *Zone 3*) upon the summit of the ridge which parts the waters of the Serpo and Lalik at 5,100 ft. or 1,552 m. (36350), and (in *Zone 4*) above Upper Rotung camp at 4,400 ft. or 1,341 m. (36300). The fruits hang under the drooping branches in January.

Alstonia scholaris, R. Brown. Hook. f., Fl. Brit. Ind. iii, p. 641. A large tree, conserved in the forests of Assam, in distribution from Africa, then as to Asia Indo-malaysian, and to Australia. It is one of the largest trees in the Plains forest, (*Zone 1*) at Kobo (37033) and Pilung: in the Hills (*Zone 3*) it was found over Balek at 2,000 ft. or 610 m. and on a small flat by the river Dihang at Kekar-Monying. Its absence along the river between Kekar-Monying and the Plains is interesting. The Abors call it Shing-gar.

Ervatamia divaricata (Linn.). *E. coronaria* Stapf: *Tabernaemontana coronaria*, R. Brown. Hook. f., Fl. Brit. Ind. iii, p. 646. An evergreen shrub, now in wide cultivation, but perhaps of Himalayan origin or Himalayo-burmese. However in the Abor Hills it was never away from signs of cultivation. It is common (in *Zone 3*) among the houses of Balek village (36436, 36888) and by Renging camp upon an old clearing, and (in *Zone 4*) near Ponging village at 1,500 ft. (36164). It was just in flower at the beginning of March. The Abors of Balek called it both Kekek and Papi.

Wrightia coccinea, Sims. Hook. f., Fl. Brit. Ind. iii, p. 654. A small tree, in distribution Assamo-burmese, observed in mixed forest (in *Zone 3*) along with *Podocarpus*, *Populus* and species of *Quercus*, at 2,300 ft. or 701 m. above Balek (36958). The Abors gave it the name of Aider timut.

Beaumontia grandiflora, Wall. Hook. f., Fl. Brit. Ind. iii, p. 660. A large evergreen woody climber, in distribution Assamo-burmese, and in China. It was found on the Plains (in *Zone 2*) at Pasighat (36867) where at the end of February it was flowering about the tops of tall trees. In the Hills (in *Zone 3*) it was fairly abundant under Rammidambang and (in *Zone 4*) then again in considerable quantity upon the east bank of the Dihang under Pang, opposite Yambung (37756) and downstream towards Sissin.

Ecdysanthera micrantha, A. DC. Hook. f., Fl. Brit. Ind. iii, p. 662. A large climber, in distribution Assamo-malaysian, and in China, found at the foot of the Hills (in *Zone 2*) at Pasighat (36861) and in the Hills (*Zone 3*) at Renging camp (36744). Its fragrant cream-coloured flowers were produced in March.

Trachelospermum fragrans, Hook. f., Fl. Brit. Ind. iii, p. 667. A big climber, in distribution Himalayo-burmese, found in high forest (in *Zone 1*) at Kobo (35964), in fruit in November.

Asclepiadaceæ.

Asclepias curassavica, Linn. Hook. f., Fl. Brit. Ind. iv, p. 18. A herb, introduced from the West Indies into many parts of the tropics, and now found wild here and there through India, found (in *Zone 1*) at Kobo (37425); but not an arrival in the wake of the Expedition.

Marsdenia tinctoria, R. Brown. Hook. f., Fl. Brit. Ind. iv, p. 34. A tall climber, in distribution Assamo-malaysian, and in China and Tonkin. Griffith got it (in *Zone 1*) at Sadiya (*Notulæ*, iv, page 52) and I found it in the Hills (*Zone 4*) at Rotung at 1,300 ft. or 396 m. (36085).

Tylophora exilis, Colebr. Hook. f., Fl. Brit. Ind. iv, p. 44. A woody climber, in distribution Himalayo-malaysian, found (in *Zone 4*) at Rotung close to the camp (36086, 37629).

Hoya fusca, Wall. Hook. f., Fl. Brit. Ind. iv, p. 58. A stout climber, in distribution Assamese, with its western limit in Central Nepal, found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36547), with its flowers below the plane of its leaves, and with very much milky juice.

Hoya arnottiana, Wight. Hook. f., Fl. Brit. Ind. iv, p. 60. A big epiphyte, in distribution Eastern Himalayan, got by Griffith (in *Zone 1*) at Sadiya.

Loga iaceæ.

Buddleia asiatica, Lour. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 82. A small shrub, in distribution Indo-malaysian and through southern China. It occurs in the Plains (*Zone 2*) near Pasighat (37434) and near Lokpur. In the Hills further (in *Zone 3*) it was upon the river bank at Janakmukh (37145), and it is a common weed of the clearings of Rammidambang, in the Serpo valley, near Renging camp (36721) and (*Zone 4*) at Rotung. It came into flower early in the year.

Buddleia candida, Dunn in Kew Bull., 1920, p. 134. A shrub, endemic, outdoing in woolliness *B. macrostachya*, Benth., var. *Griffithii*, C. B. Clarke, found (in *Zone 4*) at the mouth of the Side river (37631) and again upon the east side of the Dihang opposite Yambung camp, as low bushes scattered in sward, flowering in January.

Fagraea obovata, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 83. A small tree, usually epiphytic, in distribution Indo-malaysian, found (in *Zone 3*) of considerable size as an epiphyte along with *Ficus nervosa*, at 10 m. from the ground on a tree of *Gleditschia* at Janakmukh (37180), bearing fruit in December.

Gentianaceæ.

Etacum teres, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 95. A herb of open grassy places, in distribution Assamo-burmese with its western limit in Central Nepal. In the Plains (*Zone 1*) it finds open spots as about Sadiya, where Griffith got it in January, 1836 (*Notulae*, iv, p. 93), and the Kemi chapri near Kobo. In the Hills it was found only (in *Zone 3*) at Janakmukh on the gravel slope of the undercliff over the river (37209, 27460), with its last flowers in December, and in March sprouting afresh.

Boraginaceæ.

Cordia obliqua, Willd. *C. Myxa*, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 136. Hutchinson in Kew Bull. 1918, p. 217. A tree of rather small size, yielding a poor fruit but for which it is often cultivated, extensively spread from India to Australia, as to my region Indo-malaysian. Gammie recorded it under the name of *C. Myxa* as an abundant tree (in *Zone 1*) at Sadiya (*Records Bot. Survey India*, i, p. 71) and it exists at Kobo (36770).

Ehretia wallichiana, Hook. f., and Thoms. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 143. A tree of rather small size, in distribution Assamo-burmese, found in the Plains forest (in *Zone 2*) south of Pilung (38213) and at Pasighat (36765). Its strongly scented white upwardly directed flowers were open in March.

Rhabdia lycioides, Mart. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 145. A small shrub found in both Hemispheres within the Tropics, and on the Lower Himalaya, widespread through India in spots with one peculiar condition, namely, in streambeds. It was present (in *Zone 1*) in the bed of the river Brahmaputra at Kobo (37093) and (in *Zone 4*) in the bed of the Dihang at the following places, Yambung, under Rotung and under Ponging. Its stems do not resist the violence of the current of the river in flood, but are bent over and then root. It was in flower in November.

Tournefortia Candollii, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 146. A half-sprawling small shrub, in distribution Assamo-burmese, found (in *Zone 1*) at Sadiya (35791) among bushes, and found also in the Hills (in *Zone 4*) upon a clearing at Rotung. It was in flower in November.

Tournefortia viridiflora, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 146. A small shrub in distribution Assamese, found (in *Zone 1*) at Kobo (37411), and also in the Hills (in *Zone 3*) at Balek, flowering in March.

Tournefortia khasiana, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 147. A small shrub, in distribution Assamese, found (in *Zone 1*) at Saikhoa (32632), bearing its greenish yellow flowers in August.

Trichodesma khasianum, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 154. A small bush, up to 3-4 m. high, in distribution Assamese, found (in *Zone 3*) in the Abor Hills at Renging camp (36629) and in the Serpo valley where it was abundant from 1,700 to 1,900 ft. or 518 to 579 m. on a shingly clearing (36629), with its curiously coloured greyish brown downwardly directed abundantly honied flowers open, and fruit also ripe in the end of January.

Cynoglossum glochidiatum, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 156. A herb, in distribution Assamo-burmese, found by Gam-mie at Sadiya (*Records Bot. Survey India*, i, p. 82).

Cynoglossum micranthum, Desf. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 156. A coarse herb, in distribution Indo-malaysian. It is common on clearings in the Abor Hills, and was observed (in *Zones 3 and 4*) on those of Rammidambang (37492), Renging, Rotung, Ponging, Kalek (37567), Pabuk, Yambung and Pangl, at the greatest altitude at 3,600 ft. or 1,097 m., flowering in January.

Bothriospermum tenellum, Fisch. & Mey. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 167. A small prostrate herb, in distribution scarcely classifiable, Himalayo-chinese except that it extends into Central India. In *Zone 1* found at Kobo (36792).

Convolvulacæ.

Argyreia argentea, Chois. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 185. A half-herbaceous climber, in distribution Assamo-burmese. One of its habitats is the rivers' banks: in *Zone 1* it occurs on the bank of the Brahmaputra at Pobamukh (37049), and in *Zone 4* from the neighbourhood of Yambung it extends to the gorge under Rotung (37505). But it is still more abundant upon the clearings of the Abors, as at Rotung, where from December forward its orange or reddish fruits were conspicuous, the leaves being withered.

Lettsomia strigosa, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 193. A herbaceous climber, in distribution Assamo-burmese, (in *Zone 1*) very common in the Plains at Sadiya (35774), and at Kobo. Its pink flowers were open in November.

Lettsomia sikkimensis, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 194. A climber, in distribution Assamese, found (in *Zone 3*) on an old clearing by Renging camp and in shady jungle (in *Zone 4*) at 1,000 ft. or 395 m. near Rotung (37613), and near Kebang. It has depressed ovoid reddish berries.

Ipomoea batatas Lamk. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 202. The cultivated Sweet-Potato, American in origin, but now grown throughout the moister Tropics of the World, cultivated by the Abors under the name of Pagli, probably in most of their villages though only observed (in *Zone 4*) at Rotung and Kalek, a white tubered variety.

Ipomoea Klingli, Prain in Journ. As. Soc. Bengal, lxiii, 1895, 2, p. 110. A herbaceous climber, in distribution Assamo-burmese, occurring (in *Zone 1*) in the Plains at Sadiya (35794) and at Kobo (35963). Its flowers are open in November and December.

***Ipomoea* sp.** A very big climber which goes to the tree tops (in *Zone 3*) at Renging and (in *Zone 4*) at Puak.

Merremia vitifolia, Hallier f., *Ipomoea vitifolia* Sweet. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 213. A large subherbaceous climber, in distribution Indo-malaysian, found (in *Zone 1*) in the Plains at Kobo (36799, 38103), its lemon-yellow scentless horizontal flowers first produced in March at the same time as the new bronzed leaves.

Porana paniculata, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 222. A large woody climber, in distribution Himalayo-malaysian with an extension across the Bengal plains in Chota Nagpur. It is common (in *Zone 1*) at Sadiya (35790, 35793), and at Kobo close to the banks of the Brahmaputra; but in the Hills it seems rare for it was found only (in *Zone 3*) at Janakmukh, and (in *Zone 4*) at the mouth on the Side stream at 800 ft. or 244 m. It flowers from November forward.

Solanaceæ.

Solanum nigrum, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 229. A rather small herbaceous annual weed, found through the Tropics and the Temperate zones, not uncommon (in *Zone 1*) about the camp at Kobo, and (in *Zones 3 and 4*) upon the clearings of Rammidambang (36418) and Rotung. It was in flower through the cold season.

Solanum spirale, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 230. A half-herbaceous shrub, in distribution Assamo-burmese (in *Zone 3*) at Janakmukh (37466) and common in the clearings of Rammidambang (36450), Balek (36887) and (in *Zone 4*) Rotung to 1,600 ft. (37361). Its orange-yellow berries were ripe in December, when the shoots of a new season were springing up.

Solanum verbascifolium, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 230. A fairly large rather herbaceous shrub, in distribution in America and as regards the Old World Indo-malaysian and to Australia. It was found (in *Zone 1*) by the Brahmaputra at Kobo (37413) and (in *Zone 2*) by the Dihang at Pasighat. In the Hills it was found (in *Zone 3*) at Aieng (37223)

and on the clearing of Rammidambang (36410); then again (in *Zone 4*) it was the chief part of the coarse vegetation among planted trees at Yambung on both sides of the river, and ascending to 2,000 ft. or 610 m. on the clearings over the Libang stream. It was both flowering and fruiting through the period of the Expedition.

Solanum subtruncatum, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 231. A shrub, in distribution Assamo-burmese, growing as a weed 1 m. high (in *Zone 3*) upon the clearing of Rammidambang (36309), with its red berries ripe in December.

Solanum crassipetalum, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 232. A shrub, in distribution Assamo-burmese, present (in *Zone 3*) at Janakmukh (37463) and rather rare (in *Zone 4*) upon the clearings of Rotung at 1,000 ft. or 305 m. and in the edge of bordering forest (37532). It carried its purple flowers and red berries at the end of December.

Solanum ferox, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 233. A shrub, in distribution Indo-malaysian and in south China, found (in *Zone 3*) at 1,500 ft. or 457 m. at Balek (36574). The Abors eat its fruit and call it Bengila.

Solanum torvum, Swartz. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 234. A shrub, in distribution in America and as to Asia Indo-malaysian, extending to south-east China and to Australia, found (in *Zone 1*) as a weed at Kobo (37415), and at Sadiya covering considerable tracts of ground (Gammie in *Records Bot. Survey India*, i, p. 71).

Solanum indicum, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 234. A small shrub, in distribution Indo-malaysian, and in south China. It is a common weed (in *Zone 1*) at Kobo (37414). In the Hills (in *Zones 3 and 4*) it occurs at upper flood-limit along the course of the Dihang where streams enter it as the Yambung or at Janakmukh; at Yambung camp it is very plentiful upon both banks of the Dihang. Then again it occurs upon clearings, e.g., Rammidambang, Balek, stony slopes near Renging camp at 1,700 ft. or 518 m. (36313), Rotung and over the Libang stream at 2,600 ft. or 792 m. Its lilac downwardly directed flowers and orange red berries were alike to be found in January.

Solanum melongena, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 235. The cultivated Brinjal, widely grown through the warmer parts of the World, and by the Abors, whose name for it Baiom, so obviously borrowed, shows that it must be quite a new plant to them.

Lycopersicum esculentum, Miller. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 237. The cultivated Tomato, an American plant, which has quite recently reached the Abors. They call it Biloi Baiom which as meaning "foreign brinjal" is even more obviously a new name than that for *Solanum melongena*.

Physalis peruviana, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 238. An American herb, widely cultivated for its fruit, and found upon the clearings of the villages (*Zone 3*) of Balek and (*Zone 4*) of Rotung. The Abors call it Jorji belong.

Physalis minima, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 238. An annual herbaceous weed, in distribution Indo-malaysian, common in the Plains particularly on the banks of rivers and there below high flood-level, recorded (for *Zone 1*) by Gammie as at Sadiya (*Records Bot. Survey India*, i, p. 71), and found also at Kobo and Pobamukh. In the Hills it was sparingly present (in *Zone 4*) on the clearings of Rotung (37552).

Capsicum annuum, Linn. var. **grossum**, Sendt: *C. grossum*, Willd. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 239. This, the Chillie, is an American herb, now widely cultivated. Two races are grown (in *Zone 1*) at Sadiya: one short and yellow in fruit (32495) is a by no means uncommon Rains crop of the top of the Assam valley and is an article of commerce at Sadiya, the other which is red in fruit, ovoid, and nearly 2 cm. long; it is grown by the Abors (in *Zones 3 and 4*) which was seen on their clearings at Balek (36450) and Rotung (37542). They call it Mirshi or Marshi by a distortion of the Assamese word.

Nicotiana Tabacum, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. i, p. 245. The Tobacco plant, of American origin, and now in all Tropical and warm temperate countries, cultivated by the Abors (in *Zones 2, 3 and 4*) at all their villages under the name of Duma or Domah. (No. 36419 was collected at Rammidambang; 36443 at Balek.)

Scrophulariaceæ.

Mimulus nepalensis, Benth. Hook. f., Fl. Brit. Ind. iv, p. 258. A herb, in distribution Assamo-chinese, and to Japan, found (in *Zone 2*) upon the banks of a stream in forest at Pilung, where they were muddy (38210). Its yellow flowers were open in March.

Mazus surculosus, Don. Hook. f., Fl. Brit. Ind. iv, p. 260. A small herb, in distribution Himalayo-assamese, uncommon in the Abor Hills where

suitable localities are rare, found (in *Zone 3*) upon the undercliff at Janakmukh, (in *Zone 4*) on the Dihang bank at the mouth of the Side, on the clearings of Babuk village, and upon the side of the path from Yambung to Pangl.

Dopatrium junceum, Ham. Hook. f., Fl. Brit. Ind. iv, p. 274. A slender herb, in distribution Indo-malaysian and in China, recorded by Griffith (*Notulae*, iv, p. 102) as obtained at Sadiya, but with the date printed as September 2nd, 1835, at which he was in Calcutta. If 1836 be read for 1835, we get a date on which he was at Sadiya; and this is evidently the correction that should be made.

Curanga Fel-Terrae, (Lour.) Merrill. *C. amara*, Juss. Hook. f., Fl. Brit. Ind. iv, p. 275: *Tristeria assamica*, Griffith, *Notulae*, iv, p. 111. An annual herb, in distribution Assamo-malaysian, found (in *Zone 1*) by Griffith at Sadiya. Within the Abor Hills it is rare and was got only in one place (in *Zone 4*) namely on a clearing at 2,200 ft. or 671 m. among *Ageratum* on a hill south of the Libang stream (37735).

Torenia edentula, Griff. *T. peduncularis*, Benth. Hook. f., Fl. Brit. Ind. iv, p. 276. A small herb, in distribution Assamo-malaysian, with its western limit in Central Nepal, and with an extension across the Bengal plain in Chota Nagpur. It was found (in *Zone 4*) upon a very wet weedy clearing at 1,000 ft. or 305 m. near Rotung (37533), in flower at the end of December.

Torenia vagans, Roxb. Hook. f., Fl. Brit. Ind. iv, p. 277. A herb, in distribution Assamo-burmese and in China. This is the *T. asiatica* of Griffith (*Notulae*, iv, p. 223), got (in *Zone 1*) at Sadiya. In the Abor Hills it was found in *Zone 3* upon the undercliff below Janakmukh in an open stony spot (37208) and it occurs on clearings (in *Zone 4*) in plenty at Ponging, and Babuk. Its deep violet flowers were open in December.

Vandellia pusilla, Merrill. *V. scabra* Benth. Hook. f., Fl. Brit. Ind. iv, p. 281. A herb, found through the Tropics of the Old World, recorded by Griffith as occurring (in *Zone 1*) at Sadiya (*Notulae*, iv, 122).

Vandellia cordifolia, Merrill. *V. pedunculata* Benth. Hook. f., Fl. Brit. Ind. iv, p. 282. A low herb, in distribution Indo-malaysian, and through China, found by Griffith (in *Zone 1*) at Sadiya in 1836 (*Notulae*, iv, p. 120).

Hysanthes ciliata, O. Kze: *Bonnaya reptans*, Spreng. Hook. f., Fl. Brit. Ind. iv, p. 284. A low annual herb, in distribution Indo-malaysian and in the Chinese province of Kwangtung. It occurs (in *Zone 3*) on the edge of forest bordering clearings near Balek and (in *Zone 4*) on the clearings

of Ponging village in quantity, and from 1,400 to 2,400 ft. or 427 to 732 m. upon the clearings of the hill over the Libang stream opposite to Yambung (37732).

Hysanthes antipoda, (Linn.) Merrill. *Bonnaya veronicaefolia*, Spreng. Hook. f., Fl. Brit. Ind. iv, p. 285. *B. brachiata* Griffith, Notulae, iv, p. 117. A small herb, in distribution Indo-malaysian and in China, found (in *Zone 1*) by Griffith at Sadiya.

Scoparia dulcis, Linn. Hook. f., Fl. Brit. Ind. iv, p. 289. A small tough herb, probably of American origin, and now gradually taking complete hold of the East, so that (in *Zone 1*) it has reached Kobo, and is common there (37428), but it was not found within the Abor Hills.

Veronica javanica, Blume. Hook. f., Fl. Brit. Ind. iv, p. 296. A little herbaceous weed, in distribution Indo-malaysian, and in Japan. It was recorded (for *Zone 1*) as a Sadiya plant by Gammie (*Records Bot. Survey India*, i, p. 71), and it occurs at Kobo (36796), as well as on the pathside near Pobamukh. In the Hills it was found on the clearings (in *Zone 3*) of Renging, and in *Zone 4* of Ponging (36150), Kalek at 3,600 ft. or 1,097 m. (37568), and upon the river sands at upper flood level by Yambung camp. Its tiny white flowers were never found open, probably being always cleistogamic in the Abor Hills in December, January, February and March at any rate.

Centranthera hispida, R. Brown. Hook. f., Fl. Brit. Ind. iv, p. 301. An annual herb, in distribution Indo-malaysian and to Australia, which is not uncommon (in *Zone 1*) in the grass-land in east of Sadiya (32662) in the end of the Rains.

Gesner.aceæ.

Aeschynanthus gracilis, Parish. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 340. A shrubby epiphyte, in distribution Assamo-malaysian, found (in *Zone 3*) in high forest on the south face of Bapu at 3,500 ft. or 1,067 m. (36569), at Renging camp, (in *Zone 4*) above Upper Rotung at 4,500 ft. or 1,372 m. (36801) and at Rotung at 1,300 ft. or 396 m. (36089).

Aeschynanthus monetaria, Dunn in Kew Bull., 1920, p. 135. A woody epiphyte, endemic, found (in *Zone 3*) on the south face of Bapu at 2,500 ft. or 762 m., at Janakmukh at 800 ft. or 244 m. (37186), in the Serpo valley at the Renging refuge village, and (in *Zone 4*) at 1,300 ft. or 396 m. at Rotung (36088). Its brilliantly scarlet flowers were open in December.

Aeschynanthus micrantha, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 140. A woody epiphyte, in distribution Assamo-burmese, found (in *Zone 3*) at Janakmukh (37184) in association with *Æ. monetaria*, but in fruit in December.

Aeschynanthus acuminata, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 341. A woody epiphyte, in distribution Assamo-burmese and in Hongkong, found (in *Zone 1*) in high forest at Kobo (37075) on trees and in one individual rooting in a plant of *Asplenium Nidus*, and found (in *Zone 3*) by the Janak stream (37286), in the Serpo valley and (in *Zone 4*) at 1,000 ft. or 305 m. above Yambung camp (36003). It carried dull red flowers in December.

Aeschynanthus sp. probably new. An epiphyte with a bright red flower, and elliptic lanceolate leaves measuring 6 l. 1.25 cm. found (in *Zone 3*) on the south face of Bapu at 4,300 ft. or 1,463 m. (36918) and again upon the submit at 6,266 ft. or 1,910 m., flowering in March.

Lysionotus Griffithii, C. B. Clarke. *Loxostigma Griffithii*, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 344. A rather small shrub found epiphytically, in distribution Assamo-burmese. It occurred (in *Zone 3*) as an epiphyte at Renging camp (36741), and was found (in *Zone 4*) by a tributary of the Igar at 3,000 ft. or 914 m. (36107). Its flowers are of a very pale yellow, speckled inside abundantly with red, and were open in January and February.

Lysionotus serrata, D. Don. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 344. A small shrub, in distribution Himalayo-burmese, a showy plant sometimes epiphytic and sometimes in moss on rocks. It was found (in *Zone 3*) at Janakmukh (37272), in the Serpo valley at Renging (36670) and (in *Zone 4*) at the mouth of the Yamne at 600 ft. or 703 m. (36149). It was in flower in December and January.

Chirita Hookeri, C. B. Clarke. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 359. A herb, in distribution Assamese, found (in *Zone 4*) in the oak forest above Babuk at 3,800 ft. or 1,158 m. (37657).

Boelca filiformis, C. B. Clarke. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 362. A small shrub, in distribution Assamo-burmese, found (in *Zone 3*) at Balek (36438), where the Abors were said to call it Byonkot.

Boelca fulva, C. B. Clarke. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 362. A small shrub, in distribution Assamo-burmese, collected (in *Zone 4*) at 3,800 ft. or 1,158 m. in dense forest above Babuk (37665), and in the edge of the forest at the same height on the border of the Pangi clearings.

Tetraphyllum bengalense, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 363. A slightly woody herb, in distribution Assamese, found in the shade of high forest, its four leaves evenly spaced if the light is evenly dispersed, as the leaves of *Paris*; but if there be a greater amount of horizontal light falling on one side then with three leaves to the lower side, and one above the terminal bud. It was found in the Hills (in *Zone 3*) at Janakmukh, upon the Shile river, both above and below Renging camp (36244) extending up to 2,200 ft. or 671 m., (in *Zone 4*) in the Lalik valley, close to Rotung and at Babuk (36437). The Abors called it Go-lang.

Boea herbacea, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 365. A perennial herb, in distribution Assamo-burmese, found (in *Zone 4*) only just above the Dihang at 900 ft. or 274 m. at Puak (37641) with its lilac flowers open at the end of January.

Stauranthera umbrosa, C. B. Clarke. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 371. A small herb, in distribution Assamo-malaysian growing in shade at the bottom of high forest. It was found (in *Zone 3*) at the bottom of the Serpo valley on rocks at 1,300 ft. or 396 m. (36324), at Renging (36681), (in *Zone 4*) on a rock by the Igar stream, under Rotung at 1,000 ft. or 305 m. on a shady earth bank in the gorge of the Dihang (37609), and in forest at the mouth of the Side river (36079). It was in flower and in fruit in January.

Rhynchotechum ellipticum, A. DC. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 373. A somewhat woody herb, in distribution Assamo-burmese. It grows (in *Zone 1*) to a height of 1 m. plentifully about Sadiya (35788), Kobo (35993) and from Kobo to Pobamukh (37048). In the Hills it was found (in *Zone 3*) at Janakmukh, (in *Zone 4*) over the Igar to 3,200 ft. or 975 m., at Yambunꝝ and over Pangi to 3,000 ft. or 1,158 m. The last of its downwardly directed crimson flowers were found in December, and at the time the white fleshy fruits were almost ripe.

Rhynchotechum vestitum, Hook. f. & Thoms. C. B. Clarke in Hook. f. Fl. Brit. Ind. iv, p. 373. A small shrub, in distribution Assamo-burmese, found in (*Zone 3*) by the Janak stream (37296) with its fleshy white fruits ripe in December.

Rhynchotechum calycinum, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 374. A small shrub, in distribution Assamese, found (in *Zone 3*) on the Janak stream (37282) with its white fruits ripe in December.

Gesneracea. A stemless herb, with elliptic or ovate-elliptic leaves, which are densely pubescent with hairs slightly tawny, bluntly doubly serrate,

and sometimes purple below between the lateral veins, 13 by 3.5 m. in dimensions, the capsules are very slender, being at least 7 cm. long. This little herb (in *Zone 3*) grows on rocks upon the south face of Bapu at 2,900 ft. or 884 m., in the Serpo valley at 1,400 ft. or 427 m. near Renging camp at 2,400 ft. or 732 m. (36248, 36670); and (in *Zone 4*) north-east of Bapu towards Ripshing-Sieng at 5,700 ft. or 1,737 m., in the Igar valley at 1,800 ft. or 549 m. (36830) and close to the Dihang near Yambung camp. Its flower was reported as light blue, and to appear first in March.

Bignoniaceæ.

Oroxylum indicum, Vent. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 378. A small deciduous tree, in distribution Indo-malaysian, almost the commonest of the small trees in a particular type of new jungle found (in *Zone 1*) between Sadiya and its ferry to Saikhoa.

Stereospermum chelonoides, DC. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 382. A tall tree, in distribution Indo-burmese, and cultivated in Malaya: it is a revenue tree in Assam. Gammie recorded it (for *Zone 1*) as a tree of Sadiya (*Records Bot. Survey India*, i, p. 71). It is to be found in the Abor hills, as (in *Zone 3*) at Renging or (in *Zone 4*) at Rotung, over the mouth of the Sirong river and on the east side of the Dihang opposite Yambung. It was flowerless at the time of the Expedition. Here and there on clearings individual trees of this species were observed to stand as if spared intentionally in the felling of the surrounding forest: the truth about them was not ascertained.

Pedaliaceæ.

Sesamum indicum, DC. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 387. Now a widely cultivated oil-seed which probably had its origin in Asia and possibly in India. It is grown in gardens (in *Zone 1*) sparingly at Sadiya, and is grown (in *Zone 4*) by the Abors upon their clearings. According to Lorraine the Abors call it Nam-dung and To-tok.

Acanthaceæ.

Thunbergia grandiflora, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 392. A rather large woody climber, in distribution Assam-chinese, observed (in *Zone 2*) as a rare plant at Pilung in the forest of the Plains.

Thunbergia coccinea, Wail. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 393. A woody climber of moderate size, in distribution Himalayo-burmese, letting its flowers on long branches hang into the light diffusion space of the forest in which it grows. It was found (in *Zone 1*) at Sadiya, at Kobo, and (in *Zone 2*) at Pilung but at the last place rare. In the Hills it was found chiefly near the Dihang as (in *Zone 3*) at Janakmukh, (in *Zone 4*) at Rotung in the gorge, by the mouth of the Side river, and between Yambung and Sissin. It was also (in *Zone 3*) at Rammidambang and upon the south face of Bapu at 3,500 ft. or 1,067 m. and (in *Zone 4*) over Rotung at 2,000 ft. or 610 m. Its cinnabar flowers were to be found from November to March.

Ruellia. A herb found (in *Zone 4*) above upper Rotung camp at 4,700 ft. or 1,433 m. (36819) in oak forest, its leaves long-lanceolate 20 by 5 cm. in dimensions, its capsules nearly ripe.

Strobilanthes glomeratus, T. Anders. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 448. A shrub, in distribution Assamo-burmese, up to 5 m. in height, its stems up to 5 cm. in diameter and rooting in their lowest 25 cm. liking partial shade, its branches arching out to the light and bearing asymmetric leaves. It is common (in *Zone 1*) in the Kobo forest (35953), and across the Plain to Behrung and (in *Zone 2*) Lokpur. Its violet nearly straight flowers were found in November. In them the two perfect stamens are generally unequal, but without rule whether the right or the left should be the longer. With December flowering ceased and thousands of capsules began to ripen.

Strobilanthes aborensis, Dunn in Kew Bull., 1920, p. 208: *S. Mastersii*, Burkill in Journ. As. Soc. Bengal, xii, 1916, p. 253, not of T. Anders. A shrub Assamese, liking rather open places and in them growing to 3.5 m. in height, always weak if shaded in any marked degree, (in *Zone 1*) plentiful at Sadiya and Kobo and northwards across the Plains to Behrung. Then in the Hills (in *Zone 3*) upon the clearings of Renging and (in *Zone 4*) Rotung, and about Yambung in plenty upon both sides of the river Dihang, up the hills to 1,800 ft. or 549 m. Outside my area it was got at Makum towards the Naga Hills (35757). Its pale lilac flowers were open in November and December.

Strobilanthes macrostegius, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 456. A shrub, attaining a height of 4 m. in distribution Assamo-burmese, showy and striking in appearance, growing in high forest or upon its edge (vide plate III, figure A). In the Plains (in *Zone 2*) it was found at Pilung (37110), Lokpur, and by Pasighat (37445), it extended into the Hills. In the Hills it was common (in *Zone 3*) on the Shile stream towards Balek and in the Serpo valley, where it failed to ascend above 1,500 ft. or 457 m. and all

up the Dihang valley (in *Zone 4*) to Yambung (and doubtless further) growing in the forest at no great distance from the river's edge, or by its tributaries. At Rotang it was found as high as 3,500 ft. and at 2,600 ft. or 792 m. over the Libang stream. It was in flower in December and January. The flowers are of a claret-tinted lilac, more claret than other species of the genus as found in the Abor Hills. The lobes of the corolla are notably cleft, and there are four stamens. The inflorescence is strictly upright, up to 10 cm. long, the bracts variegated.

Strobilanthes Burkilli, Dunn in Kew Bull. 1920, p. 208. A small shrub, endemic, with zigzag branches arching out of the forest-edge into the light along the sides of paths or the edges of clearings. In the Plains it was not uncommon here and there, (in *Zone 2*) from Behrung and Pilung (37107) to Pasighat, and beyond just into the Hills (*Zone 3*) at Janakmukh. This area is in the main the area of the Pleistocene gravels. The corolla is of a lighter violet than that of *S. discolor*, and is hooded; the narrowest part of the tube is slightly twisted as in *Dicliptera* but less so, and as in *Dicliptera* always in one direction. The position assumed by the flowers is not as constant as it is in *S. macrostegius*. The flowers were found in December.

Strobilanthes discolor, T. Anders. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 462. A shrub, in distribution Assamese, found (in *Zone 2*) at Behrung in the Plains (37105) and thence northwards to Pasighat, flowering in December. The flower is hooded, with four fertile stamens, and is darker in colour than that of *S. aborensis* or *S. glomeratus*.

Strobilanthes secundus, T. Anders. C. B. Clarke, in Hook. f., Fl. Brit. Ind. iv, p. 468. A small shrub, in distribution Assamese, yellow flowered, found (in *Zone 3*) at Balek (36432), Janakmukh (37273), by the Sireng river, by the Janak stream in considerable abundance, at Renging (36702), (in *Zone 4*) upon the east slope of the Lalik valley, and along the margin of the clearings of Pangî at 3,000 ft. or 914 m. Its inflorescence nods. The Abors call it Ta-gam.

Strobilanthes coloratus, T. Anders. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 473. A shrub, nearly 2 m. high, in distribution Assamese, found in the Plains (in *Zone 2*) by streams under Balek and between Balek and Janakmukh, and at Pasighat (37116), being common just north of the last named place. Its flowers are claret and were found from December through January, just into February.

***Strobilanthes* sp.** with the leaves variegated as in *S. dyerianus*, Hook. f. but less showy. It is a prostrate species, nowhere found in flower, but as cons-

picuous as if in flower on account of the white cloudings on the leaf, and quite frequent. It was found (in *Zone 3*) on the south face of Bapu at 3,500 ft. and 4,800 ft. or 1,067 and 1,463 m., (in *Zone 4*) on the hills immediately over Rotung, plentifully from 2,000 ft. to 4,000 ft. or 610 to 1,219 m. and below at 800 ft. or 244 m. by the mouth of the Side river (36066). In this last place it was associated with the *Strobilanthes* below, No. 37761.

Strobilanthes tenax, Dunn in Kew Bull., 1920, p. 209. A shrub, endemic, collected (in *Zone 1*) at Kobo (36785).

Strobilanthes near *S. glomeratus*, T. Anders. A half-shrubby plant with large bright green leaves, attaining 1 m. in height, growing gregariously over considerable areas between 3,500 and 4,000 ft. or 1,067 and 1,219 m. on a spur (in *Zone 3*) immediately over Renging camp along the edge where it drops very steeply into the Serpo valley (36303). It was not one of the species of the genus which flowered during the time of the Abor Expedition.

Strobilanthes sp. A plant with big broadly obovate leaves, the dimensions of which are up to 25 by 15 cm., found (in *Zone 4*) in oak forest on a hill-crest over Upper Rotung camp at 4,700 ft. or 1,433 m. (36809) in vigorous growth but flowerless.

Strobilanthes sp. A half-shrubby plant springing up gregariously in great abundance (in *Zone 3*) upon the summit of Papu after it had been cleared for the Trigonometrical Survey, having existed less conspicuously in the forest before the clearing (36946). Its leaves are ovate.

Strobilanthes sp. A half-shrubby plant with small broadly ovate leaves, found in considerable quantity (in *Zone 4*) over the mouth of the Yamne river, at the mouth of the Side river, and at the mouth of the Yambung stream (37761); and again above Rotung at 3,200 ft. or 975 m. It has lilac flowers which are bent over so as to present the mouth horizontally; and the fertile stamens are four. It was in flower in December, and in fruit at the end of January.

Acanthus leucostachyus, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 480. A herb of deep shade, in distribution Assamo-burmese, found (in *Zone 3*) by the Sipi river, and along the Dilang valley in high forest, at Janakmukh in forest of *Vatica Shingkeny* (36515) at 1,000 ft. or 305 m. in great abundance, and (in *Zone 4*) between the Side river and Puak (36123).

Eranthemum palatiferum, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 498. A herb, about 1. m. high, in distribution Assamo-burmese, found

(in *Zone 1*) in dense shade to the north-west of Sadiya (35789). It had completed a rather grudging flowering in November.

Codonacanthus parviflorus, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 500. A herb, in distribution Assamo-chinese. It was found plentifully in the Hills (in *Zones 3 and 4*) from their very edge at 700 to 3 000 ft. or 213 to 914 m. under the shade of *Vatica Shingkung* at Rammidambang or elsewhere in forest of various types. It was particularly plentiful near the east bank of the Dilang below Yambung towards Sissin (36017) where *Terminalia myricarpa* was observed to be the commonest tree, and also upon the south slope of Eapu. No. 36461 was collected between the Dihang and Aicng; No. 36311 on the edge of the Seipo valley near Ronging camp. The flowers appeared in December; they are white with sometimes a pink flush inside.

Cistacanthus? A herb found (in *Zone 4*) above Rotung on a hill-crest at 4,700 ft. or 1,433 m. (36811) just going out of flower.

Phlogacanthus curviflorus, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 511. A coarse herb, of forest openings, in distribution Assamo-burmese, found (in *Zone 3*) by the Dihang at Janakmukh (37126), by the Sijun stream under Rammidambang, on the edge of the clearings of Rammidambang (36412), (in *Zone 4*) by the Side stream, and by the stream at Puak, by the Yambung stream and in disturbed forest near Yambung camp. Its livid pink flowers were open in December.

Phlogacanthus Wallichii, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 511. A coarse herb, in distribution Assamese. It was found in or on the edge of forest in the Hills (in *Zone 4*) at 800 ft. or 244 m. at the mouths of the Side and Sireng rivers, and from the upper edge of the clearings of Rotung at about 3 000 ft. or 914 m. upwards to the hill crests at 5,000 ft. or 1,524 m.; it was found on the hill crest over Babuk, and at 2,300 ft. or 701 m. in the Lalik valley (37344). Its coral red flowers were open in January.

Phlogacanthus asperulus, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 512. A half-woody herb, in distribution Assamese, found (in *Zone 3*) upon the south face of Bapu at 4,800 ft. or 1,463 m. on a very steep place (36566), with its leaves in January appearing as if about to wither.

Phlogacanthus parviflorus, T. Anders. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 512. A half-woody herb, in distribution narrowly Assamo-burmese, found growing (in *Zone 3*) in shade near the Janakmukh camp (37174).

Phlogacanthus thyrsoiflorus, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 512. A half-woody herb, in distribution Himalayo-burmese, and extremely common in the grass-lands towards Dibrugarh, found in one place only within my region, namely (in *Zone 1*) at Kobo (38110), with its orange-brown flowers open in March.

Phlogacanthus guttatus, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 512. A herb, in distribution Assamo-burmese, found upon the Plains (in *Zone 2*) out from the foot of the Hills as far as Lokpur and Pilung (38183) on the sides of paths ; at Pasighat (36863) ; in the Hills (in *Zone 3*) as far as the Serpo valley and Renging camp in open places as spaces in the village of Balek (36898), and the clearing of Rammidambang (36416), while it was in forest of *Vatica Shingken* in the Serpo valley at 1,800 ft. or 549 m. (38159). The flowers were produced in March, and are dull purple or dull claret.

Phlogacanthus gracilis, T. Anders. in Herb. Calc. A herb, in distribution Assamese, of which in the Calcutta herbarium there is a sheet collected by an unrecorded botanist at "Sykhya" which I take to be Saikhoi (in *Zone 1*) and by me found on the Plains (in *Zone 2*) from Behrung and Pilung (37108) to Pasighat, in patches, being by no means uncommon about small openings on the path-side. In the Hills found (in *Zone 3*) at Janakmukh, upon the clearings of Rammidambang (36408), at 4,400 ft. or 1,341 m. over Renging, and at almost the same altitude on the south face of Bapu, (in *Zone 4*) at Rotung and over to 5,500 ft. or 1,676 m. at Babuk, and then in deep shade over the Igar stream at 3,100 ft. or 945 m. (36114). Its flowers were open in December and January. They are lilac or at times white. Over the Igar stream they were larger than elsewhere and darker in colour.

Justicia Gendarussa, Linn. f. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 532. A herb, half-woody below, in distribution Indo-malaysian but on account of cultivation, and the readiness with which it persists, more abundant than it would be without the help of man : it is also in China. Gammie recorded it as occurring (in *Zone 1*) at Sadiya (*Records Bot. Survey India*, i, p. 71), and it occurs (in *Zone 3*) in the Hills at Balek.

Justicia vasculosa, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 533. A fleshy herb of slightly open stream-sides in forest, in distribution Assamo-malaysian. It was found (in *Zone 2*) at the edge of the Hills at Pasighat (37115, 37438) ; and in the Hills (*Zone 3*) near Janakmukh (36854), near Rammidambang (36392), (in *Zone 4*) on the Side stream, and at 1,600 ft. or 488 m. near the Libang stream. Its fawn-coloured flowers with puce spots in the palate are produced in December and January ; and in March abundant young fruit was found.

Justicia sp. near *J. Atkinsoni*, T. Anders. and *J. pubigera* Wall. A herb of deep shade with leaves broadly rhomboid-elliptic, 20 by 10 cm. in dimensions, found (in *Zone 3*) at Renging camp (36725), over Renging camp at 4,400 ft. or 1,341 m., and again at 5,000 ft. or 1,524 m.; (in *Zone 4*) over the head of the Igar stream at 3,400 ft. or 1,036 m., in the Lalik valley from 2,300 to 3,000 ft. or 701 to 914 m. (37328), over Rotung at 4,500 ft. or 1,372 m. and at Yambung at 800 ft. or 244 m. (37700).

Justicia sp. (in *Zone 3*) at Balek (36430) and (in *Zone 4*) in secondary jungle near Rotung (36057). The Abors call it Atek.

Rhinacanthus grandiflorus, Dunn in Kew Bull., 1920, p. 135. A herb endemic, first found (in *Zone 2*) as the Hills were approached from Pasighat, suddenly becoming plentiful; then common in shade (in *Zone 3*) in the neighbourhood of Janakmukh (37117), and Rammidambang (36409), some times associated with *Vatica Shingkeng*, sometimes with other types of forest attaining in height about 1 m., rooting below at the nodes. Its conspicuous white flowers were produced in Decemebr, but thereafter it fruited very sparingly.

Rhinacanthus ? A half-woody plant 2.5 m. high, with leaves that are oblanceolate almost sessile and in dimensions up to 23 by 5 cm., and with a capsule 4-seeded and nearly 4 cm. long, found (in *Zone 3*) in oak forest at 5,500 ft. or 1,676 m. upon the water-parting between the Serpo and Igar streams (36211).

Dianthera ? A herb with primrose-yellow flowers marked on the lower lip with radiating broken red lines (in *Zone 4*) very plentiful in the gorge of the Dihang under Rotung, and on clearings near the village, then again in the gorge of the Yambung stream (37760) at 1,200 ft. or 366 m.

Rungia repens, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 549. A herb in distribution Indo-burmese:—recorded by Gammie (*Records Bot. Survey India* 1, p. 71) as a plant of Sadiya.

Rungia parviflora, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 550. A small herb, chiefly of swa d, in distribution Indo-burmese, found (in *Zone 1*) in the grazing land at Sadiya.

Peristrophe tinctoria, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 556. A herb cultivated for its dye in Assam and elsewhere, found (in *Zone 1*) at Kobo (37401), where it probably persists from old Miri cultivation.

Peristrophe fera, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 556. A herb, in distribution Assamo-burmese, found (in *Zone 1*) in the Plains at Sadiya, and (in *Zone 2*) on the bank of the Dihang near Pasighat, in rather open places : on the Hills (*Zone 3*) towards Aieng (37225) and (*Zone 4*) about the clearings of Rotung as a weed (37364).

Verbenaceæ.

Callicarpa arborea, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 567. A small tree, in distribution Himalayo-burmese, with an extension beyond the Bengal plains in Chota Nagpur. It occurs on stream-sides and on old clearings as a tree of about 12 m. in height, with the trunk at breast-height about 20 cm. through. It was found (in *Zone 1*) at Kobo (35965) and on the edge of the Hills (in *Zone 3*) at Balek (36424), upon the Janak stream (36424, 37299), by Renging, and (in *Zone 4*) by Rotung and up the Dihang valley to Puak (36033) and Yambung. It ascended the hills to 2,000 ft. or 610 m. at Renging and to 3,700 ft. or 1,128 m. over Rotung. Its bright violet-purple berries were ripe in December and January. The Balek Abors called it *la'a*.

Vitex heterophylla, Roxb. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 585. A large tree, in distribution Assamo-malaysian, and in China, found (in *Zone 3*) by Renging camp (38164) mixed with *Vatica Shingkeng* upon the edge of the denser growth of the forest of the latter.

Clerodendron griffithianum, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 590. A small tree, in distribution Assamo-burmese, found growing 5 m. high just on the edge of the Plains (in *Zone 2*) at Pilung and Pasighat : and in the Hills (in *Zone 3*) at Balek and above the village to 2,000 ft. or 610 m. (36572), at Janakmukh (36475), Renging (36731), (in *Zone 4*) Rotung at 1,300 ft. or 396 m. (37592), Puak (37618), and near the Dihang opposite Yambung. Its flowers are greenish before they open and then go white ; they are scented, and are produced in from January to March.

Clerodendron nutans, Wall. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 591. A shrub, in distribution Assamo-burmese, and into the Malay Peninsula. It occurs on the edge of the Plains (in *Zone 2*) at Pilung (38209) ; and (in *Zone 3*) in the Hills at Janakmukh (36457), Renging (36648), Balek at 1,700 ft. or 518 m. (36891) and on the south face of Bapu at 3,000 ft. or 914 m., growing to 3.5 m. in height.

Clerodendron colebrookianum, Walp. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 594. A half-herbaceous shrub, in distribution Assamo-burmese, growing in open places (in *Zone 1*) near Kobo (35922). In December it was in fruit, the green fruits made conspicuous by a red calyx.

Clerodendron near *C. griffithianum*, C. B. Clarke. A shrub, attaining a height of 4 m., found (in *Zone 3*) at Renging (36709), and (*Zone 4*) above Upper Rotung camp on the side of a footpath at 2,600 ft. or 792 m. (36171).

Holmskioldia sanguinea, Retz. C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 596. A woody sprawler, in distribution Himalayo-burmese, with an extension beyond the Bengal plains in Chota-Nagpur, found in the Abor Hills on the edge of clearings (in *Zone 3*) at Renging camp, (*Zone 4*) over the Libang stream, and by Pangi village.

Caryopteris paniculata, C. B. Clarke in Hook. f., Fl. Brit. Ind. iv, p. 597. A small shrub, in distribution Assamo-burmese, and reaching Yunnan, found (in *Zone 3*) upon the clearings of Rammidambang (36411, 37313), Renging (36696) and (in *Zone 4*) about Rotung.

Labiatae.

Ocimum basilicum, Linn. Hook. f., Fl. Brit. Ind. iv, p. 608. A herb, much cultivated in India, naturally distributed in Africa and in Asia Indo-malaysian and in China, extended thence into the Pacific, found (in *Zone 1*) near Kobo (37426).

Plectranthus coetsa, Ham. Hook. f., Fl. Brit. Ind. iv, p. 619. A half-herbaceous shrub, growing to 2 m. in height, in distribution Indo-burmese, found (in *Zone 1*) in the grass-land at Sadiya, and (in *Zone 4*) at 1,300 ft. or 396 m., near Rotung (37387), in flower in November.

Plectranthus ternifolius, Don. Hook. f., Fl. Brit. Ind. iv, p. 621. A small shrub, in distribution Himalayo-burmese and in the south of China, recorded by Gammie (*Records Bot. Survey India*, i, p. 71) as common (in *Zone 1*) at Sadiya, and occurring also at Kobo (37418).

Plectranthus Griffithii, Hook. f., Fl. Brit. Ind. iv, p. 623. A herb of forest, in distribution practically endemic, having been found elsewhere only on the Mishmi Hills. In the Abor Hills it was obtained (in *Zone 3*) at Janakmukh (37454), on the south face of Papu in abundance from 4,000 to 4,400 ft. or 1,219 to 1,341 m. (36913), (in *Zone 4*) on a very steep hill-face between the

Igar and Lalik streams at 2,200 ft. or 671 m. (37528), between Rotung and the Igar valley, and at Kalek at 3,000 ft. or 914 m. (37582).

Except for the locality at Janakmukh, it was always found above 2,000 ft. or 610 m. ; and in approaching Rotung from the side of the Igar down a path steadily falling, it gave place to the next *Plectranthus* (No. 37654). The last of its claret-magenta flowers were open in January.

Plectranthus ? A Labiate found in fruit by nomeans uncommonly but not identified with any known species. It has softly pubescent ovate acuminate leaves in dimensions up to 13 by 8 cm. It was found (in *Zone 3*) in *Talauma* forest on the south face of Bapu from 3,400 to 4,800 ft. or 1,036 to 1,463 m., and at Renging camp : and above to 4,000 ft. or 1,219 m. in oak forest, then (in *Zone 4*) over Rotung from about 2,000 to 4,300 ft. or 610 to 1,311 m., sometimes in oak forest and sometimes on old clearings, over Babuk in oak forest common upon the hill crest at 3,800 ft. or 1,158 m. (37654) and on "Signal hill" over Yambung camp.

Coleus parviflorus, Benth. Hook. f., Fl. Brit. Ind. iv, p. 625. A native of southern India, which in a small leaved race, has run wild in Dibrugarh and (*Zone 1*) Sadiya equally (35780).

Pogostemon glaber, Benth. Hook. f., Fl. Brit. Ind. iv, p. 633. A herb, in distribution Assamo-burmese, its westward limit in Central Nepal, found on a clearing (in *Zone 4*) over Babuk at about 3,100 ft. or 945 m. (37648).

Pogostemon elsholtzioides, Benth. Hook. f., Fl. Brit. Ind. iv, p. 634. A herb, in distribution Assamese, found in open places, as (in *Zone 3*) upon a steep stony clearing in the Serpo valley at 1,800 ft. or 549 m., or (in *Zone 4*) on another at Ponging at about the same altitude, and also on the banks of the Dihang near Yambung and at the mouth of the Side river (37620) ; with magenta flowers open in January.

Pogostemon intermedius, Wall. *P. parviflorus*, Benth., Hook. f., Fl. Brit. Ind. iv, p. 633. A herb, in distribution Indo-burmese, and in China, found (in *Zone 3*) at Balek (36454). The Abors call it Pepit.

Elsholtzia blanda, Benth. Hook. f., Fl. Brit. Ind. iv, p. 643. A herb, in distribution Assamo-burmese with its western limit in Central Nepal. It was found (in *Zone 1*) on the edge of a clearing at Pobamukh (37055), (in *Zone 4*) on the clearings of Ponging and Rotung, at Kekar-Monying (37623), on the clearings of Pangi village sparingly, on a clearing over the Libang stream abundantly at about 2,000 ft. or 610 m. (37743). Its white flowers were found from November forwards to January, when seed began to be produced in great plenty.

Elsholtzia ?. A herb about 75 m. high, in fruit only, in which condition it suggests *Anisomeles indica*, and also a *Calamintha*, but with the calyx of an *Elsholtzia*, found (in *Zone 3*) at Renging camp (36703), and (in *Zone 4*) at Rotung (37550).

Perilla octimoides, Linn. Hook. f., Fl. Brit. Ind. iv, p. 646. A herb, in distribution Himalayo-chinese, and to Japan, often cultivated as an oil-seed. The Abors so grow it, and it was by no means infrequent upon their clearings (*Zones 3 and 4*). It is also to be found (in *Zone 1*) at Sadiya (35901) and at Pobamukh (37052). The Abor villages at which it was got, are Aieng (37219), Rotung, Kalek and Ponging, the crops being ripe in December.

Mosla dianthera, Maximowicz. Hook. f., Fl. Brit. Ind. iv, p. 647. A herb, in distribution Himalayo-burmese and in China, (in *Zone 1*) very plentiful at Sadiya (an authenticating specimen is No. 35765 from Makum).

Calamintha gracilis, Benth. Prain in Journ. As. Soc. Bengal, lxxiv, 1908, p. 711. A herb, in distribution Assamo-malaysian, found (in *Zone 4*) on the clearings of Ponging, Rotung (37553), Kalek, Babuk and Pangi, and in clearings just above the gorge of the Yambung. It is a weed which follows *Agratum*, getting its hold on the ground in the shelter of the latter, and becoming conspicuous later. It was rather more plentiful on the clearings high up than low down.

Anisomeles indica, (Linn.) O. Ktze. *A. ovata*, R. Brown. Hook. f., Fl. Brit. Ind. iv, p. 672. A herb, in distribution Indo-malaysian, quite a common weed in India; collected (in *Zone 1*) on path sides at Kobo (35956, 37427), and within the Hills (in *Zone 4*) found on the clearings of Rotung.

Achyrosermum wallichianum, Benth. ex Hook. f., Fl. Brit. Ind. iv, p. 673. A half-woody herb, in distribution Assamo-burmese. It was found in the Plains (*Zone 2*) close under the edge of the Hills at Pasighat (37442), and (*Zone 3*) in the Hills at Balek, and (*Zone 4*) up the Dihang valley to Yambung (37707), particularly abundant where streams join the Dihang as at the mouth of the Side at 800 ft. or 243 m. (36065), and on the lower reaches of the Yambung stream at 900 ft. or 274 m.

Stachys oblongifolia, Benth. Hook. f., Fl. Brit. Ind. iv, p. 676. An annual herb, in distribution Assamese, found (in *Zone 1*) near Sadiya (32674); with its pale purple flowers in August.

Leucas linifolia, Spreng. Hook. f., Fl. Brit. Ind. iv, p. 690. A herb, in distribution in Mauritius and as regards Asia Indo-malaysian, (in *Zone 1*

rare at Kobo (37430) and (in *Zone 3*) in Balek village. At the latter place it was just in flower in March.

Paraphlomis rugosa, Prain in Ann. Roy. Bot. Gard. Calc. ix, 1901, p. 605. *Phlomis rugosa*, Benth. Hook. f., Fl. Brit. Ind. iv, p. 693. A herb, in distribution Assamo-malaysian, found (in *Zone 3*) upon a very shaded rock at 900 ft. or 274 m. over the Serpo stream (37655) ; in fruit in January.

Gomphostemma aborense, Dunn in Kew Bull., 1920, p. 135. A perennial herb, endemic. A very common plant (in *Zone 3*) at the entrance to the Hills at Janakmukh (37269), and about Balek extending upwards from the village to an altitude of 2,000 ft. or 610 m. Further it was found (in *Zone 4*) over the mouth of the Yamne. Its last dull yellow flowers were open in December.

Gomphostemma niveum, Hook. f., Fl. Brit. Ind. iv, p. 697. A stout perennial herb, in distribution Assamese, growing to 1.5 m. in height on the edge of openings in forest (in *Zone 1*) at Kobo (37001) ; with its white fruits ripe in December.

Gomphostemma lucidum, Wall. Hook. f., Fl. Brit. Ind. iv, p. 697. A stout perennial herb, in distribution Assamo-burmese and just into China, found in deep shade in the Hills (in *Zone 3*) over Balek at 2,200 ft. or 671 m. in oak forest, and on a spur over Renging camp from 3,300 to 4,000 ft. or 1,006 to 1,219 m. (36275) and (in *Zone 4*) upon the hill south of the Libang stream (37740). It was in fruit in January.

Ajuga macrosperma, Wall. Hook. f., Fl. Brit. Ind. iv, p. 704. A low herb, in distribution Himalayo-burmese, with an extension beyond the Bengal plains in Chota Nagpur. It is a plentiful weed (in *Zones 3 and 4*) in the clearings of the Abor Hills, and was recorded from those of the villages of Aieng (37224), Balek, Rotung (37585), Kalek, Babuk and Pangi ; and it was also found near the landing place of Janakmukh (37457). Its flowers were produced through the months of the expedition, and varied from blue to magenta.

Its greatest observed altitude was 3,800 ft. or 1,158 m.

Plantaginaceæ.

Plantago major, Linn. Hook. f., Fl. Brit. Ind. iv, p. 705. A low herb, in distribution wide through the temperate parts of the Old World, and penetrating into the moister Tropics, as to tropical Asia Indo-malaysian in distribution, and in China. In the Plains (*Zone 1*) at Sadiya and Saikhoa (32627).

In the Hills (in *Zones 3 and 4*) on the clearings of Renging (36612), Ponging, Rotung, Babuk, Kebang, and over the Libang stream at 2,000 ft. or 610 m., in most of these fairly common. It flowers in the Rains or earlier.

Surely Griffith meant this species by his "Plantago media ?" found at Sadiya (*Trans. Agri-Hort. Soc. India*, V, 1838, p. 131).

Amarantaceae.

Dceringia amaranthoides, (Lour.) Merrill. *D. celosioides*, R. Brown. Hook. f., Fl. Brit. Ind. iv, p. 714. A large sprawling shrub, requiring light, in distribution Himalayo-malaysian and to North Australia, as well in China on the China Sea; further it has an extension beyond the Bengal plains in Chotanagpur. It was found (in *Zone 1*) at Kobo (37404); in the Hills it was found upon old clearings and stream sides, e.g. (in *Zone 3*) on the Dihang bank north of Janakmukh, on clearings at Rammidambang (36413), within the Serpo valley close to Renging camp, and (in *Zone 4*) by a stream near Pangi. The greatest altitude was 2,100 ft. or 640 m.

Celosia argentea, Linn. Hook. f., Fl. Brit. Ind. iv, p. 714. An annual herb, in distribution now Pantropic, but to an uncertain extent as a result of cultivation, recorded by Gamble as a plant (in *Zone 1*) of Sadiya (*Records Bot. Survey India*, 1, p. 71), and in the Hills found once only, (in *Zone 4*) on an old clearing over the Libang stream at 2,000 ft. or 610 m. (37733).

Amarantus spinosus, Linn. Hook. f., Fl. Brit. Ind. iv, p. 718. An annual herb, a common weed of India, in distribution Old World; found (in *Zone 1*) on shingle in the bed of the Brahmaputra at Kobo.

Amarantus gangeticus, Linn. Hook. f., Fl. Brit. Ind. iv, p. 719. An annual herb, in distribution Pantropic, observed (in *Zone 1*) at Kobo (37431).

Amarantus viridis, Linn. Hook. f., Fl. Brit. Ind. iv, p. 720. An annual herb, in distribution Pantropic, found (in *Zone 1*) about the camp at Kobo.

Amarantus polygamus, Linn. Hook. f., Fl. Brit. Ind. iv, p. 721. An annual herb, in distribution Pantropic, found (in *Zone 1*) at Kobo (37422).

Cyathula prostrata, Blume. Hook. f., Fl. Brit. Ind. iv, p. 723. An annual herb in distribution Pantropic, a weed of clearings in the Abor Hills (in *Zone 4*) as at Rotung, and on the east bank of the Dihang opposite Yambung (36013), where it persisted into secondary jungle.

Aerua scandens, Wall. Hook. f., Fl. Brit. Ind. iv, p. 727. A rather small sprawling shrub, in distribution Indo-malaysian and in south China, found (in *Zone 3*) upon the clearings of Rammidambang (36404).

Achyranthes aspera, Linn. Hook. f., Fl. Brit. Ind. iv, p. 730. A herb, in distribution Pantropic, common (in *Zone 4*) on the clearings of Rotung and on the river-bank between Rambung and Sissin.

Chenopodiaceae.

Chenopodium album, Linn. Hook. f., Fl. Brit. Ind. v, p. 3. An annual herb, a weed and also a crop in different races, as a weed World-wide. Gammie recorded it (for *Zone 1*) as a Sadiya plant (*Records Bot. Survey India*, 1, p. 71) doubtless referring to it as a weed; and as such also it was found upon the bank of the Brahmaputra at Kobo in March. At the same time but in another race it is extensively cultivated by the Abors for its seed as a Rains crop (in *Zones 3 and 4*) so that it was ripe upon their clearings in November, standing 2 m. and more high on the clearings of Rotung (37538).

Polygonaceae.

Polygonum virginianum, Linn. Hook. f., Fl. Brit. Ind. v, p. 31. A herb, in distribution more or less round the World in the northern Hemisphere, as to Asia Himalayo-chinese and to Japan. It was found in damp places at relatively high altitudes (in *Zone 4*) as 3,400 ft. or 1,036 m. on the clearings of Babuk (37671), in damp secondary jungle above Rotung at 2,500 ft. or 762 m. (36090), between Rotung and Ponging, and round the edges of the marsh Ripshing Sieng at 5,500 ft. or 1,676 m., flowering in December and January.

Polygonum barbatum, Linn. Hook. f., Fl. Brit. Ind. v, p. 37. A herb, in distribution in Africa and in Asia Indo-malaysian and through China, found only below flood limit of the Dihang bank in sand by the outfall of a small burn (in *Zone 4*) under Ponging at 600 ft. or 183 m. (36147).

Polygonum posumbu, Ham. Hook. f., Fl. Brit. Ind. v, p. 38. A herb, in distribution Himalayo-malaysian, and through China to Japan. It is common (in *Zone 1*) in the Plains at Sadiya upon roadsides through forest (35792) along with *Nephrodium molle*. In the Hills it is in old clearings (in *Zones 3 and 4*) at Renging, Ponging, Rotung, Yambung and Kebang, ascending to 2,700 ft. or 823 m. and doubtless would ascend higher but for the want of suitable localities.

Polygonum hydropiper, Linn. Hook. f., Fl. Brit. Ind. v, p. 39. A herb, in distribution round the World, observed only (in *Zone 4*) upon the path-side by Pangí village at 1,800 ft. or 549 m. (37769).

Polygonum macranthum, Meissn. Hook. f., Fl. Brit. Ind. v, p. 40. A herb, in distribution Assamese, growing to a height of 1.25—1.75 m. in the edge of forest (in *Zone 1*) near Sadiya (35798) ; in flower in November.

Polygonum alatum, Ham. Hook. f., Fl. Brit. Ind. v, p. 41. An annual herb, in distribution in Africa and through the warmer parts of Asia to Japan and Java, rare in the Abor Hills, found twice only, (in *Zone 4*) once on the clearings above Babuk at 3,100 ft. or 945 m. (37647), and once above Pangí. It was in flower and also carried ripe fruit in December and January.

Polygonum runcinatum, Ham. Hook. f., Fl. Brit. Ind. v, p. 43. A herb, in distribution Assamo-malaysian, having its western limits in Central Nepal, and extending into southwest China, cultivated in Sikkim, common (in *Zone 4*) on the path-side at 2,500 ft. or 762 m. above Upper Rotung (36097), in flower in January.

Polygonum capitatum, Ham. Hook. f., Fl. Brit. Ind. v, p. 44. A herb, in distribution Himalayo-chinese, but only just into China, with an extension beyond the Bengal plains in Chota Nagpur. In the Plains it was found (in *Zone 1*) upon the Kemi chapri but not upon the Pilung chapri (which is in *Zone 2*). In the Hills it occurred upon clearings and in disturbed jungle (in *Zone 3*) about Janakmukh (37473), at Rammidambang, Renging (36618, 37348), (in *Zone 4*) Ponging, Rotung, Babuk and Yambung. It was not found above 4,000 ft. or 1,219 m. probably because the clearings were not observed to extend higher.

Polygonum chinense, Linn. Hook. f., Fl. Brit. Ind. v, p. 44. A herb, half-woody below, in distribution Indo-malaysian and through China to Japan. It attains a height of more than 3 m., and in the Plains is found (in *Zone 1*) in considerable abundance about Sadiya (35800, 35902) and Kobo (35950, 35959, 37094, 37098) both in the type and in the variety *corymbosa*. Northward from Kobo it occurs here and there in the forest, but not abundantly for it lacks suitable spots. It exists in the river bed at Kobo below flood level. In the Hills it occurs plentifully close to the Dihang both above and below flood level. It was found (in *Zone 3*) at Janakmukh (37122, 37158, 37168, 37474) extending as far down the slope of the uncovered bed as went the Pteridophytes *Polypodium proliferum* and *Equisetum*. In *Zone 4* at the mouth of the Sireng river it was noticed below flood-limit in sand just where water from the hill-face above percolated, and beyond the reach of this water it

ceased abruptly. In such places the variety *corymbosa* is to be found with the type. Hollows where flood-water near the banks prevents trees from asserting themselves, get occupied by a high growth of this species. Yet in spite of this need or tolerance of water it was actually found (in *Zone 3*) epiphytic upon the south face of Bapu near a waterfall. It is frequent about clearings especially on the damp edges of rather old clearings, and in such places was very common (in *Zone 4*) near Rotung (37531, 37627) opposite Yambung (37753) and over Pangi (37775) : of these last four all but 37627 are the variety *ovalifolia*. When at Rotung the Expedition started a small garden it was the most prevalent weed. Its altitudinal limit was fixed by the end of the clearings at 4,000 ft. or 126 m. It was in flower and during the months of the Expedition everywhere except in the river bed, and there it was sterile and flowerless. The Abors call it Kibu nanu.

Fagopyrum cymosum, Meissn. Hook. f., Fl. Brit. Ind. v, p. 55. A herb, in distribution Himalayo-chinese, found (in *Zone 3*) upon the clearings of Ramnidambang (36430) and Renging (36628).

Rafflesiaceæ.

Sapria himalayana, Griff. Hook. f., Fl. Brit. Ind. v, p. 71. Solms in Engl. Bot. Jahrb. Beibl. 114, 191, p. 34. A parasitic herb, one of the most complete parasites in the Phanerogams, growing on the roots of the giant species of *Vitis* that occur in the Eastern Himalaya, appearing as very large flower buds out of their surface roots, on rather bare earth as these vines with their supporting trees create so dense a shade that the flower buds have little herbaceous or low vegetation to compete with. The genus is monotypic, but very close to the Malayan genus *Rafflesia*; it occurs in the extreme eastern Himalaya, Northern Burma and in Northern Siam, and is therefore reasonably classifiable with Assamo-burmese plants.

This interesting parasite was found (in *Zone 3*) near Janakmukh at 1,200 ft. or 366 m. (36477, 36503) over Renging at 3,100 ft. or 945 m. and (in *Zone 4*) at 1,000 to 1,300 ft. or 305 to 396 m. over the mouth of the Yamne (36163), over Rotung at 4,700 ft. or 1,433 m. and near Kalek (37556).

The perianth outside is of a reddish pink, the colour of a pomegranate, the inside of the lobes is bright cinnabar to crimson with dull ochre warts like lenticels; the diaphragm is dull maroon or a dark claret-brown, and so is the inside of the chamber below it. This part of the flower smells as carrion, but not powerfully. The stigma is pale pink. The duration of the flower is some days.

Its discovery in northern Burma was made some thirty years ago by Col. Donald St. J. Grant, I.M.S., upon an expedition into the Singapore country.

Aristolochiaceae.

Aristolochia indica, Linn. Hook. f., Fl. Brit. Ind. v, p. 75. A woody climber, in distribution Indo-burmese, but not typically, found (in *Zone 3* at Renging (36608).

Aristolochia saccata, Wall. Hook. f., Fl. Brit. Ind. v, p. 76. A rather large woody climber, in distribution Himalayo-assamese, producing its flowers on its stems in the light-diffusion space of the high forest found (in *Zone 3*) near Renging camp at 1,800 ft. or 549 m. (36621, 38161).

Piperaceæ.

Houttuynia cordata, Thunb. Hook. f., Fl. Brit. Ind. v, p. 78. A perennial herb of grass-land in distribution Himalayo-chinese and in Japan, found by Griffith (in *Zone 1*) at Sadiya (*Trans. Agri.-Hort. Soc. India*, v, 1838, p. 127) and in the Abor Hills observed in leaf only, (in *Zone 4*) upon the northernmost of the clearings of Kalek.

Piper pedicelloseum, Wall. Hook. f., Fl. Brit. Ind. v, p. 81. A half-woody climber, in distribution Assamo-malaysian, found (in *Zone 2*) in forest at Pasighat (37439, 38139), growing to a height of 1.25 m.

Piper peepuloides, Roxb. Hook. f., Fl. Brit. Ind. v, p. 83. A slender half-woody climber, in distribution Assamese, extending westwards to Central Nepal, attaining a height of 2 m. in deep shade about rocks under trees (in *Zone 3*) at Janakmukh (37163), near Rammidambang (37495) and (in *Zone 4*) among trees on the steep slope of the gorge of the Dihang under Rotung at 1,200 ft. or 366 m. (37603).

Piper Betle, Linn. Hook. f., Fl. Brit. Ind. v. p. 85. A slightly woody climber, the Betle pepper vine, of uncertain origin, but of wide cultivation in India and Malaya, found in the Abor Hills only (in *Zone 3*) in the village of Balek, where it had been trained up the trunk of a *Bombax*. The Abors called it Pan having borrowed the name from the Assamese.

Piper Thomsoni, Hook f., Fl. Brit. Ind. v, p. 87. A half-woody climber, in distribution Assamese, very common (in *Zone 1*) in the Plains forest at Kobo, extending into the deepest shade, thence found northwards through the forest (of *Zone 2*) to the Hills, ascending (in *Zone 3*) the south face of Bapu st 3,400 ft. or 1,036 m. and ascending (in *Zone 4*) above Rotung to 3,600 ft. to 1,097 m. and present in the Dihang valley at least to Yambung. It was

present under Kebang and at 2,600 ft. or 792 m. over the Libang stream. It bore its black fruits from November.

The authenticating specimen for these records is No. 35713 from Makum, which is beyond my area.

Piper nepalense, Miq. Hook. f., Fl. Brit. Ind. v, p. 89. A half-woody climber, in distribution Himalayo-assamese, found (in Zone 3) at Rammidambang growing 1.5—2 m. high (37308). The Abors called it Ja-luk.

Piper nigrum, Linn. Hook. f., Fl. Brit. Ind. v, p. 90. A half-woody climber, the source of Black Pepper and White Pepper, cultivated in several parts of India, and thought possibly to be wild in south-western India, found (in Zone 3) in the forest at Janakmukh (37486), at Renging (36628), and (in Zone 4) in the Lalik valley (37345). If not indigenous it is at least quite at home. In all cases it was in the variety *macrostachyum*.

Piper attenuatum, Ham. Hook. f., Fl. Brit. Ind. v, p. 92. A half-sprawling half-climbing half-woody plant, in distribution Assamo-burmese, found on the edge of forest (in Zone 1) north of Sadiya among the trees (32649) and (in Zone 3) at Janakmukh by the camp (37267); with long loose infructescences of black berries in December.

Piper sp. near (?) *P. porphyrophyllum*, N. E. Br. A little trailing pepper with purple spotted leaves, which has already been collected in the Naga Hills (Watt 11026, from the Dekho valley). M. C. de Candolle upon Sir George Watt's specimen remarked "near *P. sarmentosum*." It is quite easy to find its pretty cordate leaves in the bottom of the high forests in the Abor Hills, but never were the plants fertile. It was (in Zone 3) on the south face of Bapu (36961) from 2,700 to 3,500 ft. or 823 to 1,067 m., over Renging from 3,500 to 4,000 ft. or 1,067 to 1,219 m., (in Zone 4) at Rotung, by the Side river, at Puak at 800 ft. or 244 m. (36027), and at Yambung.

Piper glabramentum, C. DC. in Herb. Calc. A small climber, in distribution Assamese found (in Zone 3) at Janakmukh (37467) and at Renging (36683).

Piper curtistipes, C. DC. in Herb. Calc. A small climber, in distribution Assamese, found (in Zone 3) in the oak forest at 3,100 ft. or 945 m. at Renging and at 3,700 ft. or 1,128 m., and (in Zone 4) on a hill crest over Rotung (36234); with orange berries in January.

Piper Dekhoanum, C. DC. in Herb. Calc. A small climber, in distribution Assamese, found (in Zone 3) at Renging (36624).

Piper diffusum, Vahl. A half-woody herb, partly climbing, partly growing against tree trunks, in distribution Assamo-burmese, found (in *Zone 3*) at Janakmukh (37119, 37489) and by the Serpo stream (36844) ; with short round greenish black spikes in December.

Piper (?) hymenophyllum, Miq. Hook. f., Fl. Brit. Ind. v, p. 93. This species in the flora of British India is south Indian and it is doubtful if the Assam plant is exactly the same : further it is doubtful if the specimens here enumerated should be considered as one and the same species, for the berries in some are red and in others yellow ; but otherwise they do not differ. Assuming that the yellow berried and the red berried are but varieties of the one species, it is a herb of considerable abundance, found (in *Zone 1*) at Kobo (35962, 35998) in forest, and northwards (to *Zone 2*) very commonly at Pilung and Lokpur (37109) ; then (in *Zone 3*) between Janakmukh and Aieng (37237) and lastly (in *Zone 4*) above upper Rotung camp at 4,700 ft. or 1,433 m. in oak forest (36804). It was in fruit in December.

Peperomia reflexa, A. Dietr. Hook. f., Fl. Brit. Ind. v, p. 99. A small herb epiphytic on tree trunks, or sometimes on rocks in deep shade, in distribution Indo-malaysian and in China, found in the Abor Hills in the mossy oak forest, thus, (in *Zone 3*) on the south face of Bapu from 3,500 ft. or 1,067 m. to the summit at 6,266 ft. or 1,910 m. (36555, 36940), over Renging on the water-parting between the Lalik and Serpo at 5,100 ft. or 1,554 m. (36363).

Peperomia pellucida, Kunth. Brubl in Journ. As. Soc. Bengal. iv, 1908, p. 632. A small herb, of American origin, now rather widely spread in the World, found (in *Zone 1*) under fruit trees at Sadiya, and probably introduced with them.

Chloranthaceæ.

Chloranthus officinalis, Blume. Hook. f., Fl. Brit. Ind. v, p. 100. A small shrub in distribution Assamo-malaysian, and just into China. Griffith found it plentiful in the Plains (in *Zone 1*) between Sadiya and the Mishmi Hills (*Journal*, i, p. 24 & p. 29), and it is plentiful also in dense shade of the high forest at Kobo (35946) and across the plains *via* Behrung, (in *Zone 2*) at Lokpur and Pilung and on to the Hills. In the Hills it is common (in *Zone 3*) near the Dihang at Janakmukh, (in *Zone 4*) by the mouth of the Yamne river, in the gorge at Rotung, and onwards to Yambung. It is rather rare above 1,300 ft. or 396 m., but it was found (in *Zone 3*) on the south face of Bapu at 2,700 ft. or 823 m., and twice (in *Zone 4*) over Rotung at 4,700 ft. or 1,433 m. Its white berries were ripe in December, and its new leaves were put forth in March.

Myristicaceæ.

Knema linifolia, Warb. *Myristica longifolia*, Wall. Hook. f., Fl. Brit. Ind. v, p. 110. A tree of moderate size, in distribution Assamo-burmese, sporadic in the Abor Hills (in Zone 3) from Janakmukh and Balek where it ascends to 2,300 ft. or 701 m., (in Zone 4) past Rotung (37607) to Puak. Its flowers are produced upon the older wood of its branches, are directed earthwards, and are open in December. The spurs which produce them flower for several years.

The Abors call the tree Shu-iong.

Knema sp. A species in growth and foliage like the last, but with stellate hairs, which no Indian species apparently possesses. It was found (in Zone 4) in the Lalik valley at 2,300 ft. or 701 m. (37337) and between it and Renging camp. The leaves attain 34 by 12 cm.

Lauraceæ.

Cryptocarya Andersoni, King. Hook. f., Fl. Brit. Ind. v, p. 120. A considerable tree, in distribution Assamese, obtained (in Zone 3) on a dry ridge on the south face of Bapu at 4,700 ft. or 1,433 m., a few trees growing in a group (36966), loaded with fruit in March, which with the foliage was shot down. Unfortunately the material so got was rather meagre, and as the fruits are larger than what exists in the Calcutta herbarium, there is a slight element of doubt in the determination.

The spot where the trees occurred is abnormal, and the associated plants included *Pteris Aquilina*, *Carex flicina*, *Panicum plicatum*, *Ichnanthus pallens*, *Senecio arenosus*, and *Rubia sikkimensis*,—all local in the Abor Hills.

Cryptocarya amygdalina, Nees. Hook. f., Fl. Brit. Ind., v, p. 118. An evergreen tree of moderate size, in distribution Assamo-burmese, only found (in Zone 1) at Kobo (36789).

Bellschmidia roxburghiana, Nees. Hook. f., Fl. Brit. Ind., v, p. 121. A considerable tree, in distribution Himalayo-burmese, a little doubtfully recognised in a specimen got (in Zone 2) at Pasighat (36860). This tree is there common, the trunk with grey bark, forking low down, and the outline of the tree tapering upwards.

Bellschmidia sp. ?. A tree collected (in Zone 3) at Renging (36742) with leaves 9 by 3 cm. in dimensions, and with fruit 4 cm. long by 3 cm. in diameter. The fruit is larger and rounder than that of any other Indian species that has been seen.

Beilschmiedia ? A tree found (in *Zone 3*) at Renging camp (36668) with leaves that are obovate 17 by 10 cm. in dimensions, and with slightly ribbed fruit 3.25 cm. long and 2 cm. in diameter.

Cinnamomum Tamala, Fr. Nees. Hook. f., Fl. Brit. Ind., v, p. 128. A tree of moderate size in distribution Himalayo-burmese, found (in *Zone 2*) at Pasighat (36748). Under the Hills (on the edge of *Zone 3*) young *Cinnamomum* was plentiful on overgrown clearings.

Cinnamomum obtusifolium, Nees. Hook. f., Fl. Brit. Ind., v, p. 128. A tree of fair size, in distribution Assamo-burmese, common under the highest trees of the forest (*Zone 1*) from Kobo (35991) through *Zone 2* to the foot of the Hills and in the Hills (*Zone 3*) at Janakmukh, again common (in *Zone 4*) about Kebang, Yambung and Pangl, elsewhere not so common, ascending to 3,600 ft. or 1,097 m. over Rotung (38172). The seedlings can grow in very deep shade. The new foliage produced on the trees in January is bronzed.

The Abors gave me the name Ra-pi, but Shi-ri appears in Lorraine's Dictionary, the first syllable in it representing " shing " a tree.

Cinnamomum glanduliferum, Meissn. Hook. f., Fl. Brit. Ind., v, p. 135. An evergreen tree, a revenue tree of Assam, in distribution Assamo-burmese, if we exclude a doubtful record for Kamaon, found (in *Zone 3*) as a small tree in the Serpo valley close to Renging camp (36841).

Machilus edulis, King. Hook. f., Fl. Brit. Ind., v, p. 138. A large tree, in distribution Eastern Himalayan, common (in *Zone 4*) above the head of the Igar stream at 3,600 ft. or 1,097 m., coming into new leaf at the end of January (36178).

Machilus gammicana, King. Hook. f., Fl. Brit. Ind., v, p. 137. A large tree, in distribution Eastern Himalayan, found sterile and therefore somewhat doubtful, (in *Zone 3*) at 2,000 ft. or 610 m. near Renging camp (36330) ; carrying large leaf buds in the end of January.

Machilus Gamblei, King. Hook. f., Fl. Brit. Ind., v, p. 138. A tree, in distribution Himalayo-burmese, found (in *Zone 2*) in the Plains at Pasighat (36749) and (in *Zone 4*) close to Kebang at 2,100 ft. or 640 m. (36002), carrying large leaf buds in January.

Cryptocarya ? A tree of moderate size found (in *Zone 3*) in the forest above Balek on the lower slopes of Bapu of 2,000 ft. or 610 m. (36990), with lanceolate leaves, 11 by 2.5 cm. in dimensions.

Lauracea, suggesting the genus *Actinodaphne*, a tree with glabrescent leaves, obovate, abruptly acuminate, in dimensions up to 27 by 12 cm. and when young densely pubescent with red-tawny hairs, found (in *Zone 4*) at the head of the Igar stream at 3,600 ft. or 1,097 m. (36177).

Actinodaphne sp. near *A. obovata*, Blume. A tree conspicuous by the whiteness of the backs of the leaves, found (in *Zone 3*) upon a spur above Renging camp at 4,000 ft. or 1,219 m. (36295).

Litsea citrata, Blume. Hook. f., Fl. Brit. Ind., v, p. 155. A small tree which does service in feeding silk worms in Assam, in distribution Assamo-malaysian, found about old clearings in the Abor Plains and Hills attaining a height of about 7 m. In *Zone 1* it appeared to be at Kobo (35968); in *Zone 3* (36428) it was found at Balek and near Balek at 3,300 ft. or 1,006 m.; at Renging camp (36733) and above it at 2,400 ft. or 732 m. (37320), at Rotung; in *Zone 4*, at Ponging at 2,000 ft. or 610 m., at the mouth of the Sireng river (37391). Further it was in forest over the head of the Igar stream at 3,200 ft. or 975 m. and on the edge of the swamp Ripshing Sieng at 5,500 ft. or 1,676 m. (36975). It flowered in December and January. The Abors called it Roil.

Litsea lancifolia, Roxb. Hook. f., Fl. Brit. Ind., v, p. 159. A small tree in distribution Assamo-burmese, found (in *Zone 2*) in the Plains at Pasighat (37449, 38137), (in *Zone 3*) in the Hills at Balek (36900), in forest between Janakmukh and Rammidambang (37307), and in the neighbourhood of Renging camp (36678, 36745). It was in fruit in March.

Litsea polyantha, Juss. Hook. f., Fl. Brit. Ind., v, p. 162. A tree of medium size, in distribution Himalayo-or Indo-burmese and on the China coast. It is common (in *Zone 1*) at Kobo (35979) in the variety *grandiflora*, and especially so along the edge of the Kemi chapri. It is plentiful, again in the cut-over forest (in *Zone 3*) close to Balek village at 1,400 ft. or 427 m. and in clearings on the Sipi and Shile rivers. It occurs also at Janakmukh (37485).

The Abors called it Ta-peut, like *L. laeta*.

Litsea khasyana, Meissn. Hook. f., Fl. Brit. Ind., v, p. 164. A considerable tree, in distribution Assamo-burmese, found (in *Zone 3*) between Janakmukh and Aieng (37221).

Litsea salicifolia, Roxb. Hook. f., Fl. Brit. Ind., v, p. 167. A small tree, in distribution Assamo-burmese with its western limit in Central Nepal and an occurrence on the Oudh plain below. It is a common shrub or small tree in secondary jungle in the Plains (*Zone 2*) near Pasighat (36747, 37432): in the Hills it occurred (in *Zone 3*) just under Balek (36995), at Janakmukh

(37470), on the Janak stream (37298), (in *Zone 4*) in the gorge of the Dihang under Rotung (37501, 38184) and very plentifully about old clearings at Ponging and Rotung (36136, 36828) and Yambung. Its altitudinal limit seemed to be about 2,000 ft. or 610 m. It was in flower in December.

Litsea laeta, Wall. Hook. f., Fl. Brit. Ind., v, p. 169. A tree of medium size, in distribution Assamese, found in the Abor Hills (in *Zone 3*) about the village of Balek at 1,400 ft. or 427 m. (36505), at Janakmukh (37484), (in *Zone 4*) on "Signal hill" over Yambung camp in secondary jungle (37709), and in forest at 1,200 ft. or 366 m. east of the Dihang towards the Libang stream (37749). Then again it was got in the variety *major* (in *Zone 3*) in the Serpo valley (36842). It flowered sparingly in January; and the Serpo valley specimen was in new leaf in March. The Abors called it Ta-peut.

The leaves of the variety *major* attained 13 in. or 33 cm. in length. Such variation has its counterpart in *L. salicifolia*.

Litsea sp. A tree with leaves elliptic, shortly acuminate to the apex, glabrous, dull below with chestnut veins when dry 17 by 4 cm. in dimensions, found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36931).

Litsea sp. A big tree fully as large as any of its associates, with leaves elliptic-ovate, shortly acuminate, drying brown, glabrous above, pubescent below, in dimensions to 16 by 6 cm., the young leaves densely tawny pubescent, found (in *Zone 4*) upon the "razor-edge" ridge between the Lalik and Igar streams (38170).

Litsea ? A rather large tree, with leaves that are large horizontal obovate glabrous above, pubescent below drying with a purplish tint as do so many of the genus *Litsea*, in dimensions up to 30 by 17 cm., and with fruits that are 5 cm. long with a diameter of 2 cm., blunt below, hemispheric above, and carried in the month of March below the foliage, found (in *Zone 4*) above upper Rotung camp at 2,600 ft. or 792 m. (38188).

Litsea sp. near *L. paramonja*, Ham. A tree found (in *Zone 4*) in forest at Puak (37679).

Lindera pulcherrima, Benth. Hook. f., Fl. Brit. Ind., v, p. 185. A large tree, in distribution Himalayo-burmese, found (in *Zone 3*) at 5,100 ft. or 1,554 m. upon the water-parting between the Lalik and the Serpo (36358).

Lauracea. A tree with flaky brown bark, and bright dark green leaves, elliptic acuminate, in dimensions 14 by 4 cm., found (in *Zone 3*) upon a "razor-edge" ridge on the water-parting between the Serpo and the Lalik valleys at 5,100 ft. or 1,554 m. (36355).

Proteaceæ.

Helicia erratica, Hook. f., Fl. Brit. Ind., v, p. 189. A tree of medium size, in distribution Assamo-burmese and in southern China, found (in Zone 3) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36562, 36926) carrying pendulous fruits from January to March. An interesting feature of the seed is that it is an intense purple throughout the interior.

Helicia sp. near *H. excelsa*, Blume. A big tree, found (in Zone 3) upon the spur above Renging at 3,800 to 4,000 ft. or 1,219 m. (36304), in fruit in January.

Helicia sp. A large tree, at least 40 m. high with a girth at breast-height of 1.5 m., its leaves thin, elliptic, slightly crenate, in dimensions 16 by 5 cm., found (in Zone 4) upon the summit of the hill immediately over Rotung at 4,700 ft. or 1,433 m. (36815).

Helicia sp. doubtless an undescribed species. It has large almost spatulate leaves 26 by 15 cm. in dimensions, with a short petiole, and brown pubescence chiefly on the nerves; together with a globose fruit 3 cm. in diameter. It is a large straight tree, and was found (in Zone 4) at 1,900 ft. or 579 m. over Upper Rotung camp, with fruit in March (38187).

Thymeliaceæ.

Daphne involuerata, Wall. Hook. f., Fl. Brit. Ind., v, p. 193: *D. Wallichii* Meissn. A tall shrub, in distribution Assamo-burmese, found attaining 3.5 m. in height (in Zone 3) at Rammidambang (37312) and above Rammidambang towards the Serpo valley (36849), at Renging (36619) and above Renging to 3,100 ft. or 945 m. and then again higher where the rim of the Serpo valley is the water-parting between the Serpo and the Lalik streams at 5,300 ft. or 1,615 m. (36218), upon the summit of Bapu at 6,266 ft. or 1,910 m. (36548) and on a very steep spur over Renging camp from 4,000 to 4,400 ft. or 1,219 to 1,341 m. (36281, 36287), and also in a similar habitat on a "Razor-edge" ridge on the water-parting between the Serpo and the Igar at 5,100 ft. or 1,554 m. At Rammidambang it just penetrated forest of *Vatica Shinkeng*. The salmon pink or white fragrant flowers were open in January, hanging sometimes on long, sometimes on short peduncles underneath the branches.

Elacagnaceæ.

Elacagnus pyriformis, Hook. f., Fl. Brit. Ind., v, p. 202. A shrub, with a tendency to be a sprawler, in distribution Eastern Himalayan, growing (in

Zone 2) very sparingly upon the Pilung chapri, near Pasighat (37436), and (in *Zone 3*) in the Hills in some plenty above Janakmukh, in forest close to the river Dihang from extreme flood level for a little way in (37131). The flowers which are directed upwards are produced in December.

Loranthaceæ.

Loranthus Collettii, King ex Coll. and Hemsl. in Journ. Linn. Soc., xxviii, 1890, p. 124. A woody parasite in known distribution Burmese. Fallen flowers of a light pink exactly matching those of *L. Collettii* were collected (in *Zone 3*) upon the south face of Rapu in *Talauma* forest at 3,800 ft. or 1,158 m. (36530), in the end of January. The determination in the want of other parts remains doubtful.

Loranthus pulverulentus, Wall. Hook. f., Fl. Brit. Ind., v, p. 211. A woody parasite, in distribution Himalayo-burmese, found in *Zone 3* upon the summit of Rapu at 6,266 ft. or 1,910 m. (36942); and (in *Zone 4*) on *Quercus* at 2,000 ft. or 610 m. over the Igar river (37526), and above Upper Rotung at 4,500 ft. or 1,372 m. (36803); flowering from December to February.

No. 38156 from the Serpo valley (*Zone 3*) is probably the same: but the specimens have been mislaid.

Loranthus sp. with bright scarlet flowers, observed (in *Zone 4*) in the Lalik valley upon several species of trees, *Cedrela* being one, and seen also above Rotung.

Balanophoraceæ.

Balanophora dioica, R. Brown. Hook. f., Fl. Brit. Ind., v, p. 237. A small red-brown herbaceous parasite, in distribution Assamo-burmese with its western limit in Central Nepal, growing (in *Zone 3*) on roots of an undetermined climber, and perhaps also upon other plants, always in high forest at Janakmukh (37175), and (in *Zone 4*) near Rotung (37357) and above Babuk at 3,800 ft. or 1,158 m. (37670); coming into flower in December.

Rhopalocnemis phalloides, Jungh. Hook. f., Fl. Brit. Ind., v, p. 239. A small chestnut to fawn herbaceous parasite in distribution Assamo-malaysian with its western limits in Central Nepal, found (in *Zone 4*) at 4,100 ft. or 1,250 m. in high forest over Upper Rotung (36822), with flowers in March.

Euphorbiaceae.

Euphorbia antiquorum, Linn. Hook. f., Fl. Brit. Ind., v, p. 255. A small cactus-like tree, wild and widely cultivated in India; in upper Assam cultivated for fencing or persisting from fencing. (In *Zone 1*), it is at Sadiya (36682) and must have been for a considerable time, and (in *Zone 3*) is in Balek (36508) but there newly, the villagers who had planted it as a fence admitting that they themselves had brought it from the Plains. They had no name for it. It was in flower at the end of January.

Bridelia assamica, Hook. f., Fl. Brit. Ind., v, p. 269. A small tree, in distribution Eastern Himalayan, found (in *Zone 1*) at Kobo (35925) with very bright green fruits at the end of November.

Bridelia stipularis, Blume. Hook. f., Fl. Brit. Ind., v, p. 270. A large sprawling shrub, in Africa, and as regards Asia Indo-malaysian, found (in *Zone 4*) in the gorge of the Yambung stream at 1,000 ft. or 305 m. (37754).

Actephila neilgherrensis, Wight. *A. excelsa*, Muell.-Arg. Hook. f., Fl. Brit. Ind., v, p. 282. A small tree or shrub, of unusual distribution, in the Peninsula of India and in Burma, but touching the Himalaya only in the Abor and Mishmi Hills as an extension of the area in Burma including the country between Burma and Assam. It was found (in *Zone 3*) as a shrub 2-3 m. high in disturbed jungle and on old clearings at Janakmukh (37128), Balek (36426), (in *Zone 4*) in the gorge above the mouth of the Yamne river, by Puak (37621) and at Yambung, always at low levels. Its fruits were hanging under its horizontal branches in December. The Abors called it Tor-bin.

Andrachne emicans, Dunn in Kew Bull., 1920, p. 210. A small slender shrub, endemic, (in *Zone 1*) attaining a height of nearly 3 m., found at Kobo (35955, 37068) in shade, and (in *Zone 4*) at the mouth of the Sireng river at 800 ft. or 244 m. (37390).

Phyllanthus brevipes, Hook. f., Fl. Brit. Ind., v, p. 297. A half-herbaceous shrub, in distribution endemic, having been got only as yet in the Abor and Mishmi Hills. It was found attaining 5 m. in height on the bank of the Dihang at upper flood limit (in *Zone 3*) at Janakmukh (37147), (in *Zone 4*) under Rotung and at Puak, and also on clearings at 1,300 ft. or 396 m. at Rotung. It was in flower in December.

Phyllanthus Clarkel, Hook. f., Fl. Brit. Ind., v, p. 297. A small half-herbaceous shrub, in distribution Assamese, (in *Zone 1*) found in deep shade at Kobo (35935), (in *Zone 3*) about Janakmukh, and (in *Zone 4*) upon the bank of the Dihang opposite Yambung (36012).

Glochidion mishmiense, Hook. f., Fl. Brit. Ind., v, p. 327. A bush with brittle branches, in distribution endemic, having been found as yet only in the Abor and Mishmi Hills, occurring (in *Zone 4*) at Pangî at the edge of the clearings of the villages at 2,500 ft. or 762 m. (37789); in January with dull red fruits.

Sauropus androgynus, (Linn.) Merrill. *S. albicans*, Blume. Hook. f., Fl. Brit. Ind., v, p. 332. A small shrub, in distribution Indo-malaysian, found (in *Zone 3*) in the village of Balek (36431).

Sauropus macrophyllus, Hook. f., Fl. Brit. Ind., v, p. 333. A shrub, in distribution Assamese, (in *Zone 4*) attaining a height of 2-3 m. in secondary jungle at 900 ft. or 274 m. upon the east bank of the Dihang opposite Yambung (37751); with rosy red fruits in January.

Bischofia javanica, Blume. Hook. f., Fl. Brit. Ind., v, p. 345. A more or less deciduous tree of moderate size, a revenue tree in Assam, in distribution Indo-malaysian. It occurs in the Abor Hills chiefly along the banks of the rivers at the limit of forest towards them; thus it was found (in *Zone 2*) from Pasighat in the Plains (36869) through *Zone 3* to *Zone 4*, upwards to Rotung (37512) and on the Yambung. It was away from the river between Rotung and the Sireng at 1,000 ft. or 305 m. In the month of March it produced its new foliage. According to Lorraine the Abors call it Tak-kir.

Baccaurea sapida, Muell.-Arg. Hook. f., Fl. Brit. Ind., x, p. 371. A tree of medium size, in distribution Assamo-malaysian. Gammie recorded (*Records Bot. Survey India*, 1, p. 71) that (in *Zone 1*) it is one of the prevalent small trees of Sadiya; and it was found (in *Zone 3*) at Balek at 1,400 ft. or 427 m. (36506), the fruit eaten by the Abors under the name of Bureh.

Jatropha curcas, Linn. Hook. f., Fl. Brit. Ind., v, p. 383. A shrub, of American origin, now world-wide through the Tropics mostly through cultivation, not uncommon (in *Zone 1*) about Sadiya village.

Croton caudatus, Geiseb. Hook. f., Fl. Brit. Ind., v, p. 388. A large sprawling shrub, in distribution Indo-malaysian, observed (in *Zone 4*) upon the east bank of the Dihang opposite Yambung at about 900 ft. or 274 m., and a little further north by a stream near Pangî village.

Croton tiglium, Linn. Hook. f., Fl. Brit. Ind., v, p. 393. A small tree, in distribution Assamo-malaysian; the source of one of the arrow poisons of the Abors, the seeds for the purpose apparently obtained locally, but the tree was not found by me north of the Brahmaputra.

Croton sp. A bush with leaves obovate shortly acuminate in dimensions up to 28 by 10 cm., the largest always accompanied by two minute leaflets at the base. The plant bears solitary female flowers in the leaf-axile. It was found (in *Zone 3*) near Renging camp (36654), in flower in January.

Ostodes paniculata, Blume. Hook. f., Fl. Brit. Ind., v, p. 400. A small tree, in distribution Assamo-burmese, found (in *Zone 4*) at Kalek at 3,600 ft. or 1,097 m. (37558).

Claoxylon khasianum, Hook. f., Fl. Brit. Ind., v, p. 411. A small tree, in distribution Assamese, found (in *Zone 3*) near Renging camp (36699).

Mallotus albus, Muell.-Arg. Hook. f., Fl. Brit. Ind., v, p. 429. A tree of small or medium size, in distribution Indo-Burmese, an invariable mark of clearings at a certain stage of their return to forest and common on the edge of any open space such as a well-marked path or course of a river; but as regards the clearings far from being equally abundant on all. For how long it holds its own I cannot say: but I have shown reason to think (*Gardens Bull. Straits Settlements*, ii, 1919, p. 157) that the similar *Macaranga triloba*, Muell.-Arg., holds its own in Singapore for thirty and more years. *Mallotus albus* is everywhere in the Hills (*Zones 3 and 4*) to about 3,000 ft. or 914 m. and occasionally to 3,600 ft. or 1,097 m. As it gets to be a tree it casts its lower branches. No. 36030 was collected at Puak; and No. 36047 at Kekar-Monying.

Mallotus sp. A small tree with leaves ovate, rounded below, softly pubescent serrate, up to 9 by 5.5 cm. in dimensions with two glands at the base, found somewhat gregariously at the top of the clearing of Rammidambang (36850) with bright new foliage in March.

Cleidion javanicum, Blume. Hook. f., Fl. Brit. Ind., v, p. 444. An evergreen tree of medium size, in distribution Indo-malaysian, found close to the banks of the Dihang from 700 to 1,000 ft. or 213 to 305 m. (in *Zone 3*) at Janakmukh (36483), (in *Zone 4*) near the mouth of the Side river (36072) and at Puak (37675). Its flowers were obtained in January.

Macaranga denticulata, Muell.-Arg. Hook. f., Fl. Brit. Ind., v, p. 446. A rather small evergreen tree, in distribution Assamo-malaysian, found in the Abor Hills upon stream-sides taking advantage of the seam that they make in the forest to reach out into the sunlight, so (in *Zone 3*) bordering the Janak stream (37294), and so upon the under cliff over the Dihang south of Janakmukh standing in brakes of *Miscanthus nepalensis*, as well as across the Dihang towards Aieng (36459): and also (in *Zone 4*) on clearings at Rotung.

The Ahors apparently call it, according to Lorraine, E-rag or Ragar.

Macaranga pustulata, King. Hook. f., Fl. Brit. Ind., v, p. 445. A shrub or small tree, in distribution Himalayan, found (in *Zone 4*) in the clearings near Puak, and over Bábuk in great plenty from 900 to 1,000 ft. or 274 to 305 m. in great plenty (36029, 36031), ants living in the hollowed branches.

Homonoia riparia, Lour. Hook. f., Fl. Brit. Ind., v, p. 455. A tree of unusual spots with a trunk that may be of considerable size, as big as that of a pollard *Salix* (*vide* Plate X-B) which lies in the shingle, and sends up its osier-like branches from the stream bed to vegetate when the rivers are low and to remain submerged through the Rains; in distribution Indo-malaysian.

It occupies the river-bed between flood-level and extreme low water, where shingly, (in *Zone 1*) at Kobo (35926) and at Pobamukh (38233) its branches of limited growth alone being exposed above the shingle (*vide* Plate X, - A) they leaf at the end of November very deliberately, as the waters fall and flower in February, at which time seedlings appeared. The first flowers were all male and close to the ground. The limit of the plant down-stream appears is to be Silonimukh, which is where shingle (sil means astone in Assamese) is first encountered in ascending, the second place being Pobamukh. The tree is in the Dihang (in *Zone 2*) as it crosses the Plain, *e.g.*, Pasighat (36480).

In the Hills *Homonoia* occurs along the course of the Dihang in shingle or wedged between rocks, from Janakmukh (in *Zone 3*) up to Yambung (in *Zone 4*), but avoiding places where the current is fierce. Judged by its occurrence, the conditions which it desires are not met where backwaters, slowly moving, permit sand to settle, nor where the water in flood passes with the force of a torrent, but where the stream packs together stones varying from the size of a man's fist to the size of a man's head.

The twigs commonly show scars produced by the current sawing one over another.

Ricinus communis, Linn. Hook. f., Fl. Brit. Ind., v, p. 457. The Castor Oil Plant, a half-woody herb or a herb, probably African in origin, but widely cultivated, found (in *Zone 1*) in old clearings at Pobamukh, and (in *Zone 3*) in actual cultivation at Balek (36442). The Abors call it Aki-rang-mi; and Lorraine gives further names in his Dictionary,--E-no-rang and Mipak-shing-ar,

Baliospermum calycinum, Muell.-Arg. Hook. f., Fl. Brit. Ind., v, p. 462. A shrub, in distribution Assamese, collected (in *Zone 3*) at the edge of Hills between Janakmukh and Aieng (37241).

Euphorbiacea. A half-erect half-sprawling shrub, 2 to 3 m. high with leaves elliptic in dimensions 14 by 5 cm. and with clusters of small green male

flowers in the axils, found (*Zones 1 and 2*) commonly in the Plains forest all the way from Kobo to Pasighat (36763). Between Lokpur and Pasighat it was observed to climb half way into the *Terminalia* trees (38132). It is much regretted that the female flowers were not collected.

Euphorbiaceæ. A bush about 3 m. high with arching branches which carry their female flowers horizontally on the ends of small panicles: these female flowers terminating the inflorescences have below them apparently many males, the leaves are obovate shortly acuminate, with a few small teeth along the margins, in dimensions 11 by 4 cm. This plant was got (in *Zone 3*) in forest of *Vatica Shingkeng* at Rammidambang (38142).

Euphorbiaceæ, closely allied to No. 38142. A similar bush with the same type of inflorescence differing in having narrower leaves without teeth which are broadly lanceolate and in dimensions up to 12 by 3.5. It was found (in *Zone 4*) on a "razor edge" ridge above Upper Renging camp in shade at 2,800 ft. or 853 m. (36333).

Ulmaceæ.

Ulmus lancifolia, Roxb. Hook. f., Fl. Brit. Ind., v, p. 480. A big tree, in distribution Himalayo-burmese, with arching and almost weeping branches, and dark grey bark holding in its plentiful roughnesses an abundant supply of epiphytes, found on the bank of the Dihang (in *Zone 3*) at upper flood-limit close to the mouth of the Janak stream (37268) and (in *Zone 4*) where the Sireng river enters the Dihang. It was in fruit in December.

Celtis tetrandra, Roxb. Hook. f., Fl. Brit. Ind., v, p. 482. A tree attaining considerable dimensions, in distribution Indo-malaysian, found in the Plains (*Zone 2*) on the south side of Pilung (38214) and at Pasighat (36752); and in the Hills (*Zone 3*) at Janakmukh (36852). Trees were seen with a clean bole of 17 m.

Celtis trinervia, Roxb. Koorders Excursionsflora v. Java ii, 76. *C. Wightii*, Planch., Hook. f., Fl. Brit. Ind., v, 483. A tree, in distribution Indo-malaysian and to Australia, found (in *Zone 3*) over Balek upon the south face of Bapu at 4,800 ft. or 1,463 m. (36567) in *Taenuma* forest, and (in *Zone 4*) over Babuk at 2,500 ft. or 762 m.

Celtis sp. near *C. trinervia*, Roxb. A tree attaining a considerable size, found (in *Zone 2*) in the Plains at Pasighat (36866). It has ovate leaves 11 by 5.5 cm. in dimensions, and with the veins below very prominent.

Trema orientalis, Blume; *T. amboinensis*, Blume. Hook. f., Fl. Brit. Ind. v, p. 484. A tree of fair size, in distribution Assamo-malaysian, and Chinese, quick to take advantage of any felling in the forest, found in the Hills (in *Zone 3*) about old clearings at Balek (36879), Renging (36631), in the Serpo valley, very abundantly (in *Zone 4*) along the upper flood-limit of the Dihang from the Side river to Puak (36024, 37691) and to Yambung; at Rotung, and to 3,500 ft. or 1,067 m., above it, to 3,300 ft. or 1,006 m. near Kalek above Babuk, and over the Libang to 2,600 ft. or 792 m.

It went nearly bare in January and then broke into new leaf. The Abors called it Bum-lau.

Moraceæ.

Morus laevigata, Wall. Hook f., Fl. Brit. Ind., v, p. 492. A big tree, a valuable revenue tree of Assam, in distribution Himalayo-burmese, found in the Plains (*Zone 2*) on a stream side at Lokpur, and at Pilung not rare (38212); is new leaf and flower at the end of February and in March.

Morus indica, Linn. Hook. f., Fl. Brit. Ind., v, p. 492. A big deciduous tree, in cultivation also in India as a shrub for feeding silkworms, in natural distribution Himalayo-chinese, found (in *Zone 1*) in the Plains at Kobo (36771) and Pobamukh (38228), and (in *Zone 3*) in the Hills at Balek (36880), where the Abors called it Ey-um.

Sir Joseph Hooker suggested that this is Griffith's *Morus acidusus* from Saikhoa, there "common" (*Notulæ*, iv, p. 389).

Ficus gibbosa, Blume. Hook. f., Fl. Brit. Ind., v, p. 496. A large or fairly large tree, in distribution Indo-malaysian, and in China, found (in *Zone 3*) only at Rammidambang (37500).

Ficus mysorensis, Heyne. Hook. f., Fl. Brit. Ind., v, p. 500. A large tree, starting life as an epiphyte, distributed Indo-burmese, found (in *Zone 2*) only at Pasighat (36871).

Ficus Hookeri, Miq. Hook. f., Fl. Brit. Ind., v, p. 505, in age. An enormous tree, commencing life as an epiphyte, abundantly rooted from say 6-7 m. up, in distribution Assamese, not uncommon (in *Zone 2*) in the Plains at Pasighat (36870); (in *Zone 3*) in the Hills in the Serpo valley (36380), at Renging camp and above it at 3,500 ft. and (in *Zone 4*) at 2,500 ft. or 762 m. between Renging camp and the Lalik valley (36372).

Ficus glaberrima, Blume. Hook. f., Fl. Brit. Ind., v, p. 506. A big tree commencing life as an epiphyte, in distribution Himalayo-malaysian, found

(in *Zone 3*) by Renging camp, and (in *Zone 4*) by water in the gorg of the Yambung (37727) at 900 ft. or 274 m., and by Pangi village, and in the Lalik valley (38165).

Ficus obtusifolia, Roxb. Hook. f., Fl. Brit. Ind., v, p. 507. A large tree, often epiphytic at first, in distribution Assamo-malaysian, observed (in *Zone 1*) at Sadiya (35796), with fruit in November.

Ficus elastica, Roxb. Hook. f., Fl. Brit. Ind., v, p. 508. The India-rubber Fig, a big, sometimes a gigantic tree, starting life as an epiphyte, in distribution Assamo-malaysian, and also to some slight extension cultivated. In the Plains (in *Zone 1*) it was observed at Kobo (37058), and in the Hills (in *Zone 3*) near Renging camp. Every tree seen had been tapped, and before the Expedition left, the Abors by way of trade had commenced to bring in balls of its rubber. They called it Ron-ne or Rot-lang. Gammie stated in the *Records of the Botanic Survey*, i, p. 73, that on the authority of Needham Abors do not tap the tree fearing its guardian spirits, but this is not the case with the Minyong Abors as a whole. The rubber got from the Abors was analysed by Dr. D. Hooper who found 76.5 Caoutchouc, 12.9 resins, 2.6 albumen, 4.8 ash and 3.2 moisture.

At Kobo a seedling was found upon an *Asplenium Nidus*.

Ficus Benjamina, Linn. Hook. f., Fl. Brit. Ind., v, p. 508. A considerable tree starting life as an epiphyte, in distribution Indo-malaysian, found only in the immediate neighbourhood of the Dihang river, (in *Zone 4*) under Ponging, at Puak (37680) and between Puak and Yambung at 900 ft. or 274 m. (37684).

Ficus nervosa, Roth. Hook. f., Fl. Brit. Ind., v, p. 512. A large spreading tree, commencing life as an epiphyte, in distribution Indo-malaysian and in China, found in the Hills (in *Zone 3*) at Janakmukh (37180), and (in *Zone 4*) at the mouth of the gorge of the Yambung (36161) at 1,200 ft. or 366 m. At Janakmukh a young plant was taken from a large forest tree at 12 m. from the ground where it was in the thickest of the foliage of the forest and therefore the shade considerable, less than at the ground, below the light diffusion space.

Ficus heterophylla, Linn. f. Hook. f., Fl. Brit. Ind., v, p. 518. A small shrub, in distribution Indo-malaysian, found (in *Zone 1*) at Sadiya to the north-east of the village (32678), at Kobo in the high forest near the river (35980), and also in some abundance occupying the upper levels of the river bed near flood limit, and to a less extent also on the shingle bed lower down

which is submerged throughout the Rains (37005), and found again in similar spots at Pobamukh.

Its orange-red fruits were ripe in December, but not in the river-bed.

Ficus obscura, Blume. Hook. f., Fl. Brit. Ind., v, p. 521. A small tree, in distribution Assamo-malaysian, and in Formosa, found (in *Zone 4*) upon the river bank at Puak and at Yambung (37685).

Ficus sikkimensis, Miq. Hook. f., Fl. Brit. Ind., v, p. 521. A small tree, epiphytic in early life, in distribution Assamese, found in the Plains forest (*Zone 2*) at 2.5 m. from the ground at Lokpur (37000) and at Pasighat (36845); and in the Hills (*Zone 4*) found in the gorge of the Dihang at Puak (37678).

Ficus hispida, Linn. f. Hook. f., Fl. Brit. Ind., v, p. 522. A tree of moderate size, in distribution Indo-malaysian and to Australia, found (in *Zone 4*) in the hill-forest over Igar stream at 3,400 ft. or 1,006 m. (36118).

Ficus prostrata, Wall. Hook. f., Fl. Brit. Ind., v, p. 523. A small tree in distribution Assamese, found (in *Zone 1*) in high forest at Pobamukh (37046), its fruits in November on branches which if basal in the surface soil were 1-2 m. long, or if cauline making short spurs.

Ficus Cunia, Ham. Hook. f., Fl. Brit. Ind., v, p. 523. A tree of medium size, in distribution Himalayo-malaysian, but extending across the Bengal plain to Chota-Nagpur and on to Central India. In the Plains (*Zones 1 and 2*) it is not uncommon in forest. Within the Abor Hills (in *Zones 3 and 4*) it is the most abundant of the trees which border openings in the forest; growing on stream-sides to 8-10 m., it throws its branches arching out into the full sunlight, and the disposal of their leaves is such as to give them the utmost of it. The Dihang banks are lined with the tree from Janakmukh up to Yambung, and it is common upon the tributary streams. It is also found on clearings as might be expected, and is in forest not uncommonly up to 3,800 ft. or 1,219 m. This altitude was recorded over Pangi, and 3,600 ft. or 1,097 m. was recorded over Rotung.

Its fruits are produced on long leafless branches running just within the soil; such branches on the under cliff at Janakmukh were nearly 7 m. long. They are produced in December.

Ficus fistulosa, Reinw. Hook. f., Fl. Brit. Ind., v, p. 525. A small tree, in distribution Assamo-malaysian, and reaching Formosa, found (in *Zone 4*) in dense forest at 1,000 ft. or 305 m. upon the east bank of the Dihang on the way from Rotung to Ponging (36141). Its fruits were present upon the trunk in January.

Ficus scandens, Roxb. Hook. f., Fl. Brit. Ind., v, p. 526. A sprawling shrub, in distribution Himalayo-burmese with an extension beyond the Bengal plains in Chota-Nagpur and Jabalpur, found (in *Zone 3*) as an epiphyte on a *Quercus* near the summit of Bapu at 6,200 ft. or 1,890 m. (36924).

Ficus foveolata, Wall. Hook. f., Fl. Brit. Ind., v, p. 528. A woody climber or rarely erect, in distribution Himalayo-malaysian, and in China and Japan, found (in *Zone 3*) at Renging camp (36663).

Ficus hirta, Vahl. Hook. f., Fl. Brit. Ind., v, p. 531. A small tree, in distribution Assamo-malaysian and in China, found in its form *F. triloba*, Ham. in the Abor Hills (in *Zone 4*) upon the east side of the Dihang between Rotung and Ponging and on the south side of the Igar stream at 3,400 ft. or 1,036 m. (36109).

Ficus silhetensis, Miq. Hook. f., Fl. Brit. Ind., v, p. 533. A shrub, in distribution Assamese, growing in grass-land liable to flooding, and in such places found (in *Zone 1*) at Sadiya (35777), also at Kobo (35984) with ripe fruit in November. Gammie recorded it as prevalent at Sadiya (*Records Bot. Survey India*, 1, p. 71).

Ficus pyriformis. Hook. and Arn. Hook. f., Fl. Brit. Ind, v, p. 532. A shrub of peculiar spots, in distribution Assamo-burmese and across China, with an extension just into the Malay peninsula. It grows in the river-bed of the Dihang below flood limit, (in *Zones 3 and 4*) abundantly from Janakmukh to Yambung; it finds a place among boulders rather than where there is sand, and so associates with *Homonoia*. It grows also in the Yambung stream near its mouth. It attains 2 m. in height at Janakmukh, with a cut-off appearance above. It was sterile in December. No. 37151 was collected at Janakmukh, and No. 37397 at the mouth of the Sireng river.

Ficus nemoralis, Wall. Hook. f., Fl. Brit. Ind., v, p. 534. A small tree, in distribution Himalayo-burmese, in the North-West Himalaya not uncommonly cultivated for fodder, in the Abor Hills observed to be not uncommon (in *Zone 3*) in association with *Allingia* in the Serpo valley and frequent about either crest of that valley both by Renging camp (36836) and over Rammidambang. It was never found off the Gondwana strata. In the beginning of March its old leaves fell, and the new ones emerged red.

Ficus Roxburghii, Wall. Hook. f., Fl. Brit. Ind., v, p. 534. A tree of medium size, in distribution Assamo-burmese and on the south-east coasts of China found in the Hills (in *Zone 3*) near the river Dihang at Janakmukh (37125), and (*Zone 4*) at Kekar-Monying and Yambung, and upon old clearings

over the Libang stream, and over the gorge of the Yambung. Its fruits were present upon the trunk in December.

Ficus pomifera, Wall. Hook. f., Fl. Brit. Ind., v, p. 535. A tall tree, in distribution Assamo-malaysian, found (in *Zone 1*) in high forest at Pobamukh (37051) and (in *Zone 4*) at 4,000 ft. above Pangi (37786). The fruits were present upon the trunks in November.

Cudrania javanensis, Trecul. Hook. f., Fl. Brit. Ind., v, p. 538. A woody sprawler, in distribution Indo-malaysian, found (in *Zone 1*) at Saikhoa (32639), with fruit in August, and plentiful about Kobo. In the Hills in *Zone 4* at Ponging, in the Rotung gorge and thence up the Dihang banks to Yambung, chiefly in places where the forest near the river had suffered interference.

Artocarpus integrifolia, Linn. f. Hook. f., Fl. Brit. Ind., v, p. 541. The Jak tree, a big evergreen tree valuable for its fruit, and a revenue tree of Assam, wild in Western India, and widely cultivated in the East. Common in cultivation (in *Zone 1*) about Sadiya (*vide* Gammie in *Records Bot. Survey India*, 1, p. 71). No Abor village (*Zones 3 and 4*) was seen without it, and at the more important one of Rotung it made considerable groves, while about Kebang and Yambung it was abundant (Plate IX-A). The greatest elevation at which it was observed was 2,000 ft. or 610 m. near Renging camp. The Abors call it Be-lang and use the fruit much : they cut steps in the trunk the more easily to harvest the fruit, and on rare occasions fence it in. The trees do not suit epiphytes save lichens, and are usually but not always free from them.

Artocarpus Chaplasha, Roxb. Hook. f., Fl. Brit. Ind., v, p. 543. A big deciduous tree, in distribution Assamo-burmese, extending westwards to Central Nepal, found (in *Zone 2*) only by the camp at Pilung (38127 bis) as a tall strongly buttressed tree, dropping its leaves in the end of February.

Conocephalus suaveolens, Blume. Hook. f., Fl. Brit. Ind., v, p. 545. A large evergreen sprawler, in distribution Assamo-malaysian, very common in the Plains forest (*Zone 1*) at Kobo (35982, 37030) and Pobamukh attaining about the mid-height of the forest, but absent from the *Terminalia* forest on the Pleistocene gravels at Pilung. In the Hills (*Zone 3*) it is on the south face of Bapu over Balek : it is not uncommon (in *Zone 4*) near the Dihang from Babuk to Yambung : it is rather rare in the Lalik valley and at Rotung where towards 2,000 ft. or 610 m. it seems to reach its limit in altitude (37367) though on Bapu it was found at 2,300 ft. or 701 m.

It is able to start life in the baskets made by *Asplenium Nidus* in the Kobo forests.

Urticaceæ.

Urtica parviflora, Roxb. Hook. f., Fl. Brit. Ind., v, p. 548. A herb, in distribution Himalayo-malaysian and in the Nilgiri Hills, a rare plant found (in *Zone 1*) at Kobo upon the side of the path towards the Hills (35948), and within the Hills only at elevations of 800 to 900 ft. or 244 to 274 m. (in *Zone 4*) about my furthest, namely near Yambung camp, in the gorge of the Yambung stream, at the mouth of that stream, towards the Libang stream and towards Puak (37683).

Laportea crenulata, Gaud. Hook. f., Fl. Brit. Ind., v, p. 549. A shrub, in distribution Indo-malaysian, common in Upper Assam about path-side and similarly disturbed places, (in *Zone 1*) plentiful at Sadiya, Kobo (35949) and (*Zone 2*) Lokpur; more rare in the Hills, but found (in *Zone 3*) by the Janak stream, in the Serpo valley, to the west of Renging camp at 2,700 ft. or 823 m., and (in *Zone 4*) at Yambung. It carried ripe seed in November.

Girardinia heterophylla, Decne. Hook. f., Fl. Brit. Ind., v, p. 550. A tall herb, in distribution Indo-malaysian, (in *Zone 1*) in disturbed forest and old clearings at Kobo in plenty (37421): in the Hills it occurs (in *Zone 3*) on Bapu above Balek to 3,600 ft. or 1,097 m., (in *Zone 4*) over Rotung to 3,600 ft. or 1,097 m., at Ponging, by the mouth of the Side river and in the gorge of the Yambung stream. It seems to be the Pe-ji of the Abors.

Pilea insolens, Wedd. Hook. f., Fl. Brit. Ind., v, p. 552. A herb, endemic, found in forest sometimes in great plenty, (in *Zone 4*) at its lowest by the mouth of the Sireng river which is just west of Rotung and over Rotung in various places (36094) to Kalek where it is very common to 2,500 ft. or 762 m., at 2,000 ft. or 610 m. between the Igar stream and Rotung (37521), at 3,000 ft. or 914 m. in oak forest west of Renging camp.

These localities are all within a restricted area at the north of the mountain of Bapu.

Pilea smilacifolia, Wedd. Hook. f., Fl. Brit. Ind., v, p. 553. A half-woody sprawler reaching a height of six feet, by the growth of stems twice as long, in distribution Assamo-malaysian, found among shrubs on old clearings or on the edge of any kind of opening in the forest, (in *Zone 3*) at 900 ft. or 274 m. at Janakmukh (36398), at Renging (36701); (in *Zone 4*) here and there along the Dihang banks from the mouth of the Side river to Yambung (36026) on the clearings of Rotung (36056, 37352) very common, and over Rotung to 4,700 ft. or 1,433 m.

On a hill-crest over Upper Rotung camp at 4,700 ft. or 1,433 m. (*Zone 4*) No. 36808 was collected which differs in small points from typical *P. smilacifolia*.

Pilea symmeria, Wedd. Hook. f., Fl. Brit. Ind., v, p. 554. A small herb, in distribution Himalayo-chinese, found among shrubs and on path-sides, extending back into deep shade, plentiful (in *Zone 3*) at 2,400 ft. or 732 m. over Renging (37347) and (in *Zone 4*) at 3,500 ft. or 1,067 m. over Rotung, and back from the Dihang bank at 900 ft. or 274 m. to near Kebang at 2,100 ft. or 640 m. (37795).

Pilea bracteosa, Wedd. Hook. f., Fl. Brit. Ind., v, p. 555. A herb, in distribution Assamo-burmese, with an extension to Formosa, and with its western limit in Central Nepal, common in secondary jungle (in *Zone 4*) on the hill side over Upper Rotung at 2,500 ft. or 762 m. (36093) in a place full of wild *Musa*, and in deep forest over Rotung at 3,600 ft. or 1,097 m. and in the Lalik valley at 2,000 ft. or 610 m.

Pilea scripta, Wedd. Hook. f., Fl. Brit. Ind., v, p. 556. A herb of fair size, in distribution Himalayo-burmese, found in the Plains (in *Zone 1*) in deep shade at Sadiya and at Kobo (35941); in the Hills (in *Zone 4*) near Ponging and near Kalek at 3,000 ft. or 914 m. (37583), over Rotung along with *P. bracteosa* at 2,500 ft. or 762 m., and on the edge of the clearings of Pangi village at 3,800 ft. or 1,158 m. (37784).

Lecanthus peduncularis, Wedd. *L. Wightii*, Wedd. Hook. f., Fl. Brit. Ind., v, p. 559. A small herb, in Africa and as to Asia Indo-malaysian, found on the outer face of the Hills (in *Zone 3*) near Balek (36876), and above on the face of Papu at 2,700 ft. or 823 m., as well as (in *Zone 4*) over the Igar stream at 3,000 ft. or 914 m. (36117). In the last named spot it grew along with the moss *Distichophyllum Griffithii* epiphytically.

Elatostema sessile, Forst. Hook. f., Fl. Brit. Ind., v, p. 563. A tufted herb, in distribution Indo-malaysian and through south China to Japan and the Pacific, found (in *Zone 1*) in very deep shade at Kobo (37060), (in *Zone 4*) on the hill side north of the Side river at 1,000 ft. or 305 m. and in very damp forest over Babuk at 3,400 ft. or 1,036 m. (37668).

Elatostema lincolatum, Wight. Hook. f., Fl. Brit. Ind., v, p. 565. A small herb, m. high, a "protean" species, says Sir Joseph Hooker, which adjective probably means that when we know it adequately it will be broken up, found in Ceylon and Malabar, in the Himalaya, and lastly on the China coast.

It occurs in the Plains (*Zone 2*) near Pasighat in deep forest: in the Hills it is frequent at low levels, (*Zone 3*) at Janakmukh (37143), on the Janak stream (37270), under Renging camp at 1,800 ft. or 549 m. in shade of *Vatica Shingheng* (36677, 38160) and near Renging (36644, 36646), (in *Zone 4*)

in the Lalik valley at 2,300 ft. or 701 m. (37331), and near Rotung at 1,000 ft. or 305 m. (37382), close to the mouth of the Sireng river at 800 ft. or 244 m. (37396), by the mouth of the Side river (36126) at the mouth of the Yamne river, and near the top of "Signal Hill" over Yambung, and in the Yambung gorge.

Elatostema hookerianum, Wedd. Hook. f., Fl. Brit. Ind., v, p. 567. A fleshy herb of high forest, in distribution Assamese: collected (in *Zone 3*) on the summit of Bapu at 6,266 ft. or 1,910 m. (36930, 36932) and (in *Zone 4*) in the Lalik valley at 2,300 ft. or 701 m. (37325, 37332). The flowers produced in December are sometimes white and sometimes pink.

Elatostema dissectum, Wedd. Hook. f., Fl. Brit. Ind., v, p. 568. A small herb, in distribution Eastern Himalayan, found in the Hills only, (in *Zone 3*) in oak forest at Renging and increasing in abundance above 2,300 ft. or 701 m., occurring up to the water-parting of the Serpo and Igar streams at 5,500 ft. or 1,676 m. (36213): (in *Zone 4*) also at 1,000 ft. or 305 m. north of the Side river (36075) and at Yambung at the same altitude (36007). Its green flowers were open in January.

Elatostema papillosum, Wedd. Hook. f., Fl. Brit. Ind., v, p. 569. A herb of hill forests, in distribution Assamese, found (in *Zone 3*) upon the east slopes of Bapu at 5,500 to 5,700 ft. or 1,676 to 1,717 m. (36973); (in *Zone 4*) on the Side river at 1,000 ft. (36077), and at 2,300 ft. or 701 m. in the Lalik valley (37333), and above Upper Rotung at 4,700 ft. or 1,433 m. (36195).

Elatostema decipiens, Wedd. Hook. f., Fl. Brit. Ind., v, p. 570. A herb with a fleshy swollen rhizome, in distribution Assamese, found (in *Zone 4*) in hill forest in dense shade by the Igar stream at 2,000 ft. or 610 m. (37527) and over the same at 3,200 to 3,400 ft. or 975 to 1,036 m. (36100), and above Rotung upon a hillcrest at 4,700 ft. or 1,423 m. where it was the commonest herb present (36810).

Elatostema Macintyrei, Dunn in Kew Bull., 1920, p. 210. A herb of shade in high forest, in distribution endemic, found (in *Zone 3*) at Renging (36734).

Elatostema arcuans, Dunn in Kew Bull., 1920, p. 209. A tufted herb, in distribution endemic, growing (in *Zone 4*) in a stream close to Rotung camp (37365) at 1,300 ft. or 396 m., with succulent ridged stems which arch over to the horizontal. in flower in December.

Elatostema imbricans, Dunn in Kew Bull., 1920, p. 209. A peculiar herb, in distribution endemic, on rocks, at the base growing upright then arching as or after it forks, found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36938), and on a "razor-edge" ridge at 5,100 ft. or 1,554 m. upon the water-parting of the Serpo and Lalik streams (36364).

Elatostema acuminatum, Brongn. Hook. f., Fl. Brit. Ind., v, p. 566. A herb, in distribution Indo-malaysian, (in *Zone 4*) very common in forest at 4,700 ft. or 1,433 m. above Upper Rotung camp (36810). Treub's observations in Java upon the apogamy of this species should be kept in mind in the examination of it elsewhere: but unfortunately its sexual arrangements were not looked into in Abor land.

Elatostema platyphyllum, Wedd. Hook. f., Fl. Brit. Ind., v, p. 566. A fairly large herb, in distribution Himalayo-assamese, often 1 m. high in the Plains forest (*Zone 2*) near Pasighat (37441) and on the bank of the stream at Pilung (38207). In the Hill (in *Zones 3 and 4*) it was about the mouths of the following three streams—Janak (36471, 37197), Sireng (37587) and Side (36049); it was in the Lalik valley at 2,300 ft. or 701 m. (37330), and on the south face of Bapu from 2,300 to 3,400 ft. or 701 to 1,036 m. (36524).

Elatostema sp. A herb with very thin unequally ovate coarsely serrate leaves with dimensions 20 by 8 cm., the stems winged, and to some extent the leaves drying brownish, found (in *Zone 4*) at Rotung at 1,000 ft. or 305 m. (37382) in young bud.

Boehmeria malabarica, Wedd. Hook. f., Fl. Brit. Ind., v, p. 575. A shrub or small tree, in distribution Indo-malaysian, found (in *Zone 2*) in the Plains near Pasighat (37443).

Boehmeria nivea, Hook. and Arn. Hook. f., Fl. Brit., Ind., v, p. 576. A small shrub native of China, the Ramie or China-grass plant, in China much cultivated, and in Assam, its cultivation being by no means rare. It is grown (in *Zone 2*) by the Abors of Balek on the Plains under the village, and the fibre is used for making fishing nets and tackle. They call it Ta-ki or Ta-kuh.

Boehmeria macrophylla, Don. Hook. f., Fl. Brit. Ind., v, p. 577. A large shrub or small tree, in distribution Himalayo-burmese, with an extension beyond the Bengal Plains in Chota Nagpur, found on old clearings and stream sides (in *Zone 3*) as at Janakmukh (37170) and on the clearings of the Serpo valley and (in *Zone 4*) of Rotung.

Boehmeria platyphylla, Don. Hook. f., Fl. Brit. Ind., v, p. 578. A small tree or large shrub, in distribution African and Indo-malaysian, and through China to Japan, common (in *Zone 1*) about Kobo on old clearings (37013), making thickets about 3 m. high.

Pouzolzia sanguinea (Blume) Wall. *P. viminea*, Wedd. Hook. f., Fl. Brit. Ind., v, p. 581. A large shrub, in distribution Himalayo-malaysian, growing on the Pleistocene gravels (*Zone 2*) between Pilung and Pasighat (37111) as a bush about 2 m. high, and in the variety *fulgens* (*Zone 3*) on the side of the Janak stream (37288) and (*Zone 4*) by the mouth of the Sireng river.

Pouzolzia pentandra, Benn. Hook. f., Fl. Brit. Ind., v, p. 583. An annual herb, in distribution Indo-malaysian, common in the grass-land (in *Zone 1*) east of Sadiya (32664) with flowers in August.

Griffith recorded it for the same place (*Notulae*, iv, p. 386).

Pouzolzia hirta, Hassk. Hook. f., Fl. Brit. Ind., v, p. 586. A half-woody herb, in distribution Himalayo-malaysian, extending thence to Australia, found (in *Zone 4*) as a weed on the clearings of Ponging at 1,000 ft. or 305m. (36152).

Smithiella myriantha, Dunn in Kew Bull., 1920, p. 210. A herb of deep shade, endemic, found in the Hills (in *Zone 4*) near the Dihang in the gorge under Rotung at 800 ft. or 244 m. (37383), above the mouth of the Side river at 1,000 ft. or 305 m. (36076), and at Puak at 900 ft. or 274 m. (37636). It was in flower in December and January.

Sarcochlamys pulcherrima, Gaud. Hook. f., Fl. Brit. Ind., v, p. 588. A large shrub or small tree, in distribution Assamo-malaysian, found (in *Zone 1*) in the Plains at Kobo (36776).

Debregeasia longifolia, (Burm.) Wedd. *D. velutina*, Gaud. Hook. f., Fl. Brit. Ind., v, p. 590. A shrub or small tree, in distribution Indo-malaysian, a woody weed attaining 3·5 m. in height on old clearings (in *Zone 1*) about Kobo abundantly (35916, 35972, 37403).

Villebrunia integrifolia, Gaud. Hook. f., Fl. Brit. Ind., v, p. 590. A small evergreen tree, in distribution Indo-malaysian, not uncommon (in *Zone 2*) upon the north edge of the Plains under Balek (36993) and between Pasighat and Janakmukh (38149). In the Hills (in *Zone 3*) it was at Janakmukh abundantly (36394, 37458) and along the Janak stream (37304). It was at the height of its flowering season in February.

Villebrunia rubescens, Blume. *V. frutescens*, Hook. f., Fl. Brit. Ind., v, p. 590. A shrub, in distribution Himalayo-malaysian and through south China to Japan, found (in *Zone 1*) in the forest at Kobo (37059, 37402).

Juglandaceæ.

Engelhardtia spicata, Blume. Hook. f., Fl. Brit. Ind., v, p. 595. A magnificent deciduous tree, but leafless for only a very short time, in distribution Himalayo-malaysian. It is common in the oak forest of the Abor Hills from 2,800 to 3,600 ft. or 853 to 1,097 m. (in *Zone 3*) on the south face of Bapu above Balek, above Renging, over the Lalik and Serpo valleys (36370) and (in *Zone 4*) over Babuk. It is doubtless the species which Griffith (*Trans. Agri.-Hort. Soc., India*, v, 1838, p. 127) said escapes into the top of the Assam Plains from the Hills.

The Abors call it Shing-ah. Its fruits fall in December.

Betulaceæ.

Betula alnoides, Ham. Hook. f., Fl. Brit. Ind., v, p. 599. A tree of moderate size: in distribution Himalayo-burmese, and through China, found (in *Zone 4*) in three places, all being where streams meet, firstly upon the north bank of the Dihang opposite Rotung where the Sili stream runs into it at 700 ft. or 213 m. (37505), secondly by the mouth of the Sireng stream west of Rotung, and thirdly at 900 ft. or 274 m. at the mouth of a small stream between Yambung and Sissin. It grew with a straight trunk 12 m. high, attaining with its foliage 20 m.

Cupuliferæ.

Quercus semiserrata, Roxb. Hook. f., Fl. Brit. Ind., v, p. 604. An evergreen tree of medium size, in distribution Assamo-malaysian, (in *Zone 3*) common but of rather small growth, about Balek and up to 2,500 ft. or 762 m. (36520, 36905), and on the water-parting between the Serpo and the Lalik streams at 4,000 ft. or 1,219 m. (36375) and (in *Zone 4*) about Yambung and Kebang, over the Libang stream (37748), along the Dihang from Puak to the Side stream and at Kekar-Monying, over Rotung at 4,700 ft. or 1,433 m. (36823).

The Abors on different occasions called it Tu-ung and Tat-tu polu. The acorns were falling in January as the new leaves appeared.

Quercus lappacea, Roxb. Hook. f., Fl. Brit. Ind., v, p. 607. A tree of medium or rather large size, in distribution Assamo-burmese, its area being almost Assamo-malaysian for it extends to Perak, found (in *Zone 2*) in the forest in the Plains at Pilung (36129, 38208) where it is common; and in the Hills (in *Zone 3*) to 2,300 ft. or 701 m. above Balek (36903) where it rules in places, and (in *Zone 4*) in the gorge of the Dihang at Puak (37644). The Abors call it Tang-i-shing. It bore flowers in January.

Quercus pachyphylla, Kurz. Hook. f., Fl. Brit. Ind., v, p. 608. A large tree, in distribution Assamo-burmese, but only just into Burma, found in the Abor Hills (in *Zone 3*) upon the water-parting between the Igar and Serpo streams at 5,000 ft. or 1,524 m. (36223). The fruit-bearing branches fall with their acorns in January.

Quercus dealbata, Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind., v, p. 609. A tree of moderate size, in distribution Assamo-burmese just entering China, found (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m., being common (36546, 36923) and upon a neighbouring ridge. The height of the tree in these places is about 18 m. The Abors called it upon different occasions To-ik and Rug-ying.

Quercus lanceifolia, Roxb. Hook. f., Fl. Brit. Ind., v, p. 616. A tree of fair size, in distribution Assamo-burmese, apparently the commonest oak in the Abor Hills (in *Zones 3 and 4*) from 900 ft. or 274 m. at their very edge below Balek, on the Sipi stream and at Janakmukh, where it is able to take possession of old clearings, back to the banks of the Dihang river at Yambung at the same elevation (37725), up to the summit of Bapu at 6,266 ft. or 1,910 m. (36925, 36936). It is particularly common about Balek (36326, 36573, 36890) where the Abors call it Shi-rang. No. 36326 was collected in the Serpo valley at 1,500 ft. or 457 m.

It flowers in January.

Quercus xylocarpa, Kurz. Hook. f., Fl. Brit. Ind., v, p. 618. A large evergreen tree, in distribution Assamo-burmese, but not westwards along the known Himalaya from the Abor Hills, its home being from the Abor Hills, through the Naga Hills, through Manipur to Arakan (a record for the Garo Hills being discarded). It is a rather common tree in the Abor Hills from 4,000 to 5,500 ft. or 1,219 to 1,676 m., (in *Zone 3*) on the south face of Bapu at 5,600 ft. or 1,707 m. (36950), e.g. (in *Zone 4*) over the head of the Igar (36185), and over Rotung. New foliage appears about the commencement of the calendar year, the acorns falling at the same time with the short branches which bear them.

Quercus Rex, Hemsl. in Hook. Ic. Plant, t. 2663. A tree of fair size which has been confused somewhat with *Q. lamellosa*. It is Assamo-burmese in distribution, while the other is Eastern Himalayan. *Q. Rex* extends from the Abor Hills into Northern Burma: while *Q. lamellosa* extends from Central Nepal to the Daphla Hills, as we know it. *Q. Rex* occurs (in Zone 3) on the south face of the outer Abor Hills from 1,600 to 2,500 ft. or 488 to 702 m., (36516, 36901) sometimes ruling, and is also down as low as the Shile stream (36586), and may even be (in Zone 1) at Sadiya for Griffith recorded *Q. lamellosa* from thence (*Trans. Agri.-Hort. Soc. India*, v, 1838, p. 126).

The Abors call it Tat-tu.

Quercus Listeri, King in Annals Roy. Bot. Gard., Calcutta, ii, 1889, p. 89. A tree of medium size, in distribution Assamese, plentiful (in Zone 4) at Puak at 900 ft. (37699) and near Pangi about 2,500 ft. or 762 m., in new foliage in January.

With some hesitation I assign also to this species my 36368, a very big tree upon the south-east side of the Lalik valley, and 36180 from above the head of the Igar at 3,600 ft. or 1,097 m. and again (in Zone 3) 36947 with fruit from the summit of Bapu at 6,166 ft. or 1,909 m.

Quercus Listeri is a species cut out of *Q. Jenkinsii*, Benth. in Hooker's Ic. Plant, tt. 1312 and 1313, and the position of the two is this. Bentham, putting together several specimens in the Herbarium of the Royal Botanic Gardens, Kew, some from Upper Assam and others from Upper Burma, created *Q. Jenkinsii*, figuring the foliage, the flowers of both sexes and the fruit. Sir Joseph Hooker in his Flora of British India, v, 1888, pp. 613, 624, dissociated the elements of which the Benthamian species had been built, recognising three, firstly *Quercus* sp. of plate 1313 from Assam and the Daphla Hills, secondly *Quercus* sp. regards as the fruit on plate 1313, also from Assam, and thirdly a *Castanopsis* being the female flowers of plate 1313 from Burma. Sir George King, independently, in the Annals of the Royal Botanic Gardens, Calcutta, ii, 1889, p. 89, put the first Assam plant under his *Quercus Listeri*, and remarked that he had in a specimen from Sir Dietrich Brandis female flowers in groups of three, which would produce a compound group of acorns and not the solitary acorn figured by Bentham, that is to say, he attached the name *Q. Listeri* to the first of Sir Joseph Hooker's species, and added its female flowers, throwing the name *Q. Jenkinsii* on to the fruit that Colonel Jenkins had given to Griffith. This is satisfactory so far.

If my fruiting No. 36947 is rightly placed, we begin to know the acorns. There are three of them fused together into a mass like the head of a hammer with dimensions 6.5 by 4 by 4 cm. and the surface is marked by scars in irregular circles of fallen processes. The Abors call it Shi-torah.

Quercus sp. A very tall straight tree with a reddish grey bark, found (in Zone 4) about 800 ft. or 244 m. by the mouth of the Side stream (36127). It bears narrowly elliptic leaves in dimensions up to 16 by 6 cm.

Quercus sp. With foliage like that of *Q. Listeri* but more drawn out at the base and thinner, collected (in Zone 3) near Renging camp (36719).

Quercus sp. A tree plentiful (in Zone 4) at 3,800 to 3,900 ft. or 1,158 to 1,189 m. upon the spur above Upper Renging camp (36306, 36308).

Castanopsis indica, A. DC. Hook. f., Fl. Brit. Ind., p. 620. A tree of considerable size, in distribution Assamo-burmese, extending to Central Nepal in the one direction and to Tonkin in the other. It was recorded by Gammie (for Zone 1) for Sadiya (*Records Bot. Survey India*, i, p. 71); and in the Hills was collected (in Zone 3) over Balek at 2,000 ft. or 610 m. (36517) and called by the Abors Shi-rang. This name occurs in Lorraine's Dictionary, and in Upendra Nath Kanjilal's Preliminary list of plants collected in 1913-14, in the latter in the redundant form Sirang-asing, the author at the same time denoting SH by the letter S as in Bengali, or (less so) in Assamese. It is however a name not restricted to *C. indica*.

Castanopsis Hystrix, A. DC. Hook. f., Fl. Brit. Ind., v, p. 620. A tree of fair size, possibly not yet accurately defined, for the Sikkim *C. Hystrix* and the Khasia *C. Hystrix* appear to differ. The Abor tree is the Khasia *C. Hystrix*, and the type therefore: in distribution it is Assamo-burmese and just into South-west China. It is common (in Zone 3) in the oak forest over Renging camp from 3,600 to 4,800 ft. or 1,097 to 1,463 m. (36286), in some places the commonest tree, and again below Renging camp in the Serpo valley at 1,500 ft. or 457 m. (36325).

Castanopsis near *C. javanica*, A. DC. A big tree differing from *C. javanica* in the coarseness of the prickles of the fruit, found (in Zone 4) upon the hill crest over Babuk village at 3,800 ft. or 1,158 m. in forest of oaks, *Castanopsis tribuloides* and *Engelhardtia* (37659), and again close to Pangi village and also close to Rotung village (36069, 37555) in places with evidence that the Abors who eat the nuts care for the trees. *C. javanica* as at present known does not pass further northward than the Shan States.

Castanopsis castanicarpa, Spach. Hook. f., Fl. Brit. Ind., v, p. 621. A large evergreen tree, in distribution Assamo-chinese, found (in Zone 3) about Balek and above at 2,000 ft. or 610 m. (36518) where it was at its leaf-fall in early February. The nuts are larger than the small ones described by Sir Joseph Hooker in the Flora of British India. The Abors eat them,

and call them Ang-keh, which name probably covers chestnuts from other species of *Castanopsis* also. Lorraine has in his Dictionary the names Ang-ke and Ang-gem-baiom for chestnuts. The tree may be called Angkeh-i-shing which it seems should be read for the Amki-asing of Upendra Nath Kanjilal's Preliminary list of plants collected in 1913-14, under *C. indica*, No. 1788.

Castanopsis tribuloides, A. DC. Hook. f., Fl. Brit. Ind., v, p. 622. A rather large evergreen tree, in distribution Himalayo-burmese, and in Formosa in a variety: it is a revenue tree of the forests of Upper Assam. Gammie recorded it (for *Zone 1*) as a tree of Sadiya (*Records Bot. Survey India*, i, p. 71). Within the Hills it is more commonly seen at the higher elevations than towards their foot. It was found (in *Zone 3*) in the bottom of the Serpo valley by the Renging refuge village at 1,400 ft. or 427 m. (36317) where a "razor-edge" ridge runs through the forest. It occupies stony slopes over Renging camp at 4,400 ft. or 1,341 m. (36296), it was on a "razor-edge" ridge on the water-parting between the Serpo and Igar streams (36222, 36361) and (in *Zone 4*) over Rotung. Between 4,000 and 5,100 ft. or 1,219 and 1,554 m. it appeared to be one of the largest of the trees of the forest, and was at such elevations on the south-east side of the Lalik valley (36367) and over Upper Rotung (36802). It was plentiful over Babuk at 3,800 ft. or 1,158 m. (37658).

Salicaceæ.

Salix tetrasperma, Roxb. Hook f., Fl. Brit. Ind., v, p. 626. A tree of medium size, in distribution Indo-malaysian, but within this area often aided by cultivation, found (in *Zone 1*) at the edge of a backwater of the Brahmaputra near Kobo, in fruit in November and December. Griffith's *Salix* from Sadiya (*Trans. Agri.-Hort. Soc. India*, v, p. 1838, p. 127) is almost certain to be this species.

Populus ciliata, Wall. Hook. f., Fl. Brit. Ind., v, p. 638. A tree of fair size, in distribution Himalayan, found (in *Zone 3*) on the outer face of the Hills above Balek at 2,000 ft. or 610 m. and at 2,300 ft. or 701 m. (36519), and also above the clearings of Rammidambang. It was leafless in January.

Ceratophyllaceæ.

Ceratophyllum demersum, Linn. Hook. f., Fl. Brit. Ind., v, p. 639. An aquatic herb, in distribution in all tropical and temperate countries, found in the plains (in *Zone 1*) by the Kundil river near Sadiya (32071), and in the Hills (*Zone 3*) in a pig-wallow at 5,500 ft. or 1,676 m. upon the water-parting of the Serpo and Igar streams (36202).

Taxaceæ.

Cephalotaxus Griffithii, Hook. f., Fl. Brit. Ind., v, p. 648. A tree of medium size, in distribution Assamo-burmese, found in the Abor Hills (in *Zone 4*) as small plants in dense shade on a narrow rocky rib of the mountain above Upper Renging camp at 2,000 and at 2,600 ft. or 610 and 792 m. (36260).

Podocarpus neriifolia, Don. Hook. f., Fl. Brit. Ind., v, p. 649. A tall evergreen tree, a valuable revenue tree of Assam, in distribution Assamo-burmese, (in *Zone 3*) on the south face of Bapu above Balek at 2,300 ft. or 701 m. (36959), and (in *Zone 4*) becoming a particularly large tree on the spurs above Upper Renging camp at 4,400 ft. or 1,341 m. (36298).

Orchidaceæ.

Oberonia Falconeri, Hook. f., Fl. Brit. Ind., v, p. 678. A little epiphytic herb, in distribution Indo-burmese, frequent (in *Zone 4*) in the neighbourhood of the Dihang from Yambung (37705) to the mouth of the Side river.

Liparis bituberculata, Lindl. Hook. f., Fl. Brit. Ind., v, p. 696. A terrestrial herb, in distribution Himalayo-assamese, found (in *Zone 4*) in oak forest on a spur above Upper Renging camp at 3,300 ft. or 1,006 m. (36288); in fruit in January.

Liparis longipes, Lindl. Hook. f., Fl. Brit. Ind., v, p. 702. A little epiphyte, widely distributed for an orchid, being Indo-malaysian and in North Australia, the Pacific and China. It is by no means uncommon in the Plains of Upper Assam (my Nos. 35717 and 35737 were got at Makum); (in *Zone 1*) I found it in forest at Kobo and it would seem to have been got by Griffith at Sadiya. If so, then Ridley's record for it in the variety *spathulata* (*Journ. Linn. Soc. Bot.*, xxii, 1886, p. 294) as "Sadiya Mts." means Sadiya plain, and is a reference to the *Liparis* which Griffith got there in January 1836 (vide *Notulæ*, iii, p. 399). In the Hills it was observed (in *Zone 4*) upon the trunk of a *Dysoxylon* at Yambung camp.

Liparis viridiflora, Lindl. Hook. f., Fl. Brit. Ind., v, p. 704. A small epiphyte, in distribution Assamo-malaysian, found (in *Zone 4*) near Rotung at 3,200 ft. or 975 m. (37516), with its green flowers open in December.

Dendrobium acinaciforme, Roxb. Hook. f., Fl. Brit. Ind., v, p. 723. An epiphyte, in distribution Assamese, found (in *Zone 4*) over the mouth of the Yamne river, by that of the Side river, and at Puak (37694), all the localities

about 800 to 900 ft. or 244 to 274 m., in each case in association with *Luisia inconspicua*, and in one case in association with *Oberonia*.

Dendrobium nobile, Lindl. Hook. f., Fl. Brit. Ind., v, p. 740. An epiphyte, in distribution Assamo-chinese, recorded under the name of *D. lindeyanum* by Griffith as got (in *Zone 1*) at Sadiya in April 1836 (*Notulae*, iii, p. 309).

Dendrobium moschatum, Wall. *D. calceolaria*, Carey. Hook. f., Fl. Brit. Ind., v, p. 744. An epiphyte, in distribution Himalayo-burmese, reaching Tenasserim southwards, recorded as found at Sadiya (in *Zone 1*) by Griffith in May 1836 (*Notulae*, iii, p. 311).

Bulbophyllum reptans, Lindl. Hook. f., Fl. Brit. Ind., v, p. 768. An epiphyte, in distribution Assamo-burmese with its western limits in Central Nepal, found (in *Zone 3*) on the crest of a ridge at 5,100 ft. or 1,554 m. on the water-parting of the Serpo and Lalik stream (36351).

Eria muscicola, Lindl. Hook. f., Fl. Brit. Ind., v, p. 789. A small epiphyte in distribution Indo-burmese, but in a curiously broken way, found (in *Zone 3*) at Renging (36691), in flower at the end of February.

Eria stricta, Lindl. Hook. f., Fl. Brit. Ind., v, p. 791. A small epiphyte, in distribution Assamo-burmese, with its western limit in Central Nepal, its eastern in Siam, in the Abor Hills found in abundance (in *Zone 3*) on trees at Janakmukh at about 15 m. from the ground (37140, 37188), on trees at the bottom of the Serpo valley, on a rock at 1,600 ft. or 488 m. on the south side of the Serpo valley (36387). Its white flowers were produced in December and January.

Eria clavicaulis, Wall. Hook. f., Fl. Brit. Ind., v, p. 799. An epiphyte of moderate size, in distribution Assamese, but interesting in that this is its first record for the Himalaya, found in flower in March (in *Zone 3*) on the south slope of Bapu at 3,800 ft. or 1,158 m. (36951), and at 4,900 ft. or 1,494 m. (36970).

Eria flava, Lindl. Hook. f., Fl. Brit. Ind., v, p. 801. A small epiphyte in distribution Assamo-burmese found in the Plains (in *Zone 2*) under the Abor Hills upon a tree of *Celtis tetrandra* to the south of Pilung (38215), with its yellow flowers open in March.

Acanthephippium sylhetense, Lindl. Hook. f., Fl. Brit. Ind., v, p. 815. *A. ringiflorum*, Griffith, *Notulae*, iii, p. 347, and *Ic. Plant Asiat.*, t. 525. A terrestrial orchid, in distribution Assamo-burmese, or almost Assamo-malaysian, brought to Griffith in May 1836, by a collector who visited the Abor Hills.

Pachystoma senile, Reichb. f. Hook. f., Fl. Brit. Ind., v, p. 812. A terrestrial herb, in distribution Indo-burmese or perhaps Indo-malaysian, found (in *Zone 1*) in the grass of the Kemi chapri (38118) and (in *Zone 2*) the Pilung chapri (38124). It comes up leafless and flowers in the beginning of March.

Ceratostylis teres, Reichb. f. Hook. f., Fl. Brit. Ind., v, p. 825. An epiphyte herb, in distribution Assamo-malaysian, found (in *Zone 3*) at about 15 m. from the ground on the underside of branches at Janakmukh (37189) and (in *Zone 4*) on trees at the mouth of the gorge of the Yamne river.

Coelogyne ovalis, Lindl. Hook. f., Fl. Brit. Ind., v, p. 836. An epiphyte, in distribution Himalayo-assamese, found (in *Zone 3*) at 15 m. from the ground on the lowest branches of trees of *Altingia excelsa* and *Gleditschia Delavayi* at Janakmukh (37187).

Otochilus alba, Lindl. Hook. f., Fl. Brit. Ind., v, p. 843. An epiphyte, in distribution Assamo-burmese, found (in *Zone 3*) in some abundance on the south face of Bapu about 4,800 ft. or 1,463 m. (36538) with its yellow-brown flowers open in the end of January. These flowers as the specific name denotes have been said to be white, but they are not so in the south face of Bapu.

Otochilus fusca, Lindl. Hook. f., Fl. Brit. Ind., v, p. 844. An epiphyte, in distribution Assamo-burmese with its western limit in Central Nepal, found (in *Zone 3*) abundantly on the water-parting between the Serpo and the Lalik streams at 5,100 ft. or 1,554 m. (36352).

Pholidota imbricata, Lindl. Hook. f., Fl. Brit. Ind., v, p. 845. An epiphyte, in distribution Indo-malaysian, found (in *Zone 1*) in the Plains at Kobo, and in the Hills (in *Zone 3*) near the Dihang at Janakmukh (37182), (in *Zone 4*) at the mouth of the Yamne and over the Yambung stream near its mouth. It was in fruit in November.

Calanthe biloba, Lindl. Hook. f., Fl. Brit. Ind., v, p. 848. A terrestrial herb, in distribution Assamo-burmese, found (in *Zone 4*) on the edge of oak forest at the top of the clearings of Pangi village at 3,000 ft. or 1,158 m. (37777), its stems storing much water.

Calanthe alismaefolia, Lindl. Hook. f., Fl. Brit. Ind., v, p. 849. A terrestrial herb, in distribution Himalayo-assamese, found (in *Zone 1*) in not very shady forest at Kobo (35966).

Calanthe angusta, Lindl. Hook. f., Fl. Brit. Ind., v, p. 849. *C. odora*, Griffith, Notulae, iii. p. 365 : Hook. f., p. 853. A terrestrial herb, in distribution Assamese, found by Griffith (in *Zone 1*) at Sadiya in April 1836.

Eulophia sp. Griffith, *Notulae*, iv, p. 350 : Hook. f., *Fl. Brit. Ind.*, vi, p. 8. A terrestrial herb, described inadequately by Griffith, as obtained (in *Zone 1*) at Sadiya, in flower in January 1836.

Cymbidium sp. observed flowerless (in *Zone 4*) upon the bank of the Dihang opposite Yambung.

Geodorum purpureum, R. Brown. Hook. f., *Fl. Brit. Ind.*, vi, p. 16. A terrestrial herb, in distribution Indo-malaysian, found (in *Zone 4*) on the north side of the Dihang at about 1,000 ft. or 305 m. on the way from Yambung to Sissin (36020).

Luisia inconspicua, Hook. f. ex King and Pantl. in *Ann. Roy. Bot. Gard. Calc.*, viii, p. 203. A small epiphyte, in distribution Assamese, with an extension beyond the Bengal Plains in Chota Nagpur; in the Plains (in *Zone 2*) common on a variety of trees including a *Pterospermum*, a *Quercus*, a *Celtis* and *Bassia butyracoides* south of Pilung (38216), and in the Hills (in *Zone 3*) near the Dihang at Rammidambang, (in *Zone 4*) the mouth of the Yamne river, of the Side river, and of the Yambung stream at Puak (37693) and on rocks under Ponging. It was in flower in March.

Phalaenopsis Mannii, Reichb. Hook. f., *Fl. Brit. Ind.*, vi, p. 30. An epiphytic herb, in distribution Assamese, in the Plains (in *Zone 1*) found in the deep shade in high forest at Kobo (37061), growing upon the vertical face of trunks close to the ground, in the Hills (in *Zone 4*) near Kebang at 1,800 ft. or 549 m. and over the Libang stream at 2,000 ft. or 610 m.

Phalaenopsis Parishii, Reichb. f. Hook. f., *Fl. Brit. Ind.*, vi, p. 31. An epiphytic herb, in distribution Assamo-burmese, in the Plains (in *Zone 2*) found at Pasighat (36873).

Sarcochilus sp. An epiphytic herb, in the Hills (in *Zone 3*) found at Renging (36692).

Vanda teres, Lindl. Hook. f., *Fl. Brit. Ind.*, vi, p. 49. An epiphytic herb, in distribution Assamo-burmese, in the Plains got by Griffith (in *Zone 1*) at Sadiya (*Notulae*, iii, p. 353).

Vanda bicolor, Griff. Hook. f., *Fl. Brit. Ind.*, vi, p. 52. An epiphytic herb, in distribution Eastern Himalayan, in the Hills (in *Zone 4*) about Rotung village on the planted Mango trees of the cleared ground at 1,300 ft. or 396 m. (38106, 38175), flowering in the end of February. Mr. Rolfe confirmed the determination.

Sarcanthus subulatus, Reichb. *S. secundus*, Griffith, Notulae, iii, p. 262. Hook. f., Fl. Brit. Ind., vi, p. 67. An epiphytic herb, in distribution Assamese, (in *Zone 1*), for the Plains recorded by Griffith as growing at Sadiya, and found at Kobo, and Pilung; in the Hills (in *Zone 3*) found by the Janak stream and (in *Zone 4*) at Rotung village at 1,300 ft. or 396 m. (37597).

Tropidia angulosa, Blume. Hook. f., Fl. Brit. Ind., vi, p. 92. A terrestrial herb, in distribution Indo-burmese, but rather curiously so, in the Plains (in *Zone 1*) found in heavy shade at Kobo (35994); in the Hills (in *Zone 3*) by the Janak stream.

Spiranthes australis, Lindl. Hook. f., Fl. Brit. Ind., vi, p. 102. A terrestrial orchid, in distribution Indo-malaysian, and through the Pacific via Australia and via Japan, in the Plains recorded by Griffith (for *Zone 1*) as at Sadiya (*Notulae*), iii, p. 384) and alluded to apparently, in the *Transactions of the Agri.-Horticultural Society of India*, v, 1838, p. 133. In the Hills (in *Zone 3*) it was found at Janakmukh at the extreme limit of floods on the bank of the Dihang at 700 ft. or 213 m. (36396). It was just in flower at the very end of February.

Zeuxine goodyeroides, Lindl. Hook. f., Fl. Brit. Ind., vi, p. 107. A terrestrial orchid, in distribution Assamo-burmese, in the Hills (in *Zone 4*) in high forest at 3,700 ft. or 1,128 m. above Upper Renging camp (36339) in fruit in January.

Goodyera procera, Hook. Hook. f., Fl. Brit. Ind., vi, p. 111. A terrestrial herb, in distribution Indo-malaysian, and on the China coast in the Hills (in *Zone 3*) about upper flood limit at Janakmukh (38141), with its white flowers open at the end of February.

Goodyera grandis, King and Pantl. in Ann. Roy. Bot. Gard. Calc., viii, p. 284. A terrestrial orchid, in distribution Eastern Himalayan, in the Plains (in *Zone 1*) found in high forest at Kobo (37100), its thick stem lying as a rhizome upon the soil and rooting and branching.

Goodyera hispida, Lindl. Hook. f., Fl. Brit. Ind., vi, p. 114. A terrestrial herb, in distribution Assamese: in the Hills, found (in *Zone 3*) in shade by the Janak stream (37289) and (in *Zone 4*) above Rotung at 4,700 ft. or 1,433 m. It has variegated foliage.

Hetaeria rubens, Benth. Hook. f., Fl. Brit. Ind., vi, p. 115. A terrestrial herb, in distribution Assamo-burmese: in the Plains (in *Zone 2*) in high forest at Lokpur, and between Pasighat and Balek (36874), in the Hills (in *Zone 3*) over Balek at 2,300 ft. or 701 m. (36904, 36955), in flower in March.

Pogonia sp. Griffith, Notulae, iii, p. 376: Hook f., Fl. Brit. Ind., vi, p. 121. A terrestrial herb, in the Plains (in *Zone 1*) found by Griffith "in fields" at Sadiya in May, 1836.

Zingiberidaceæ.

Globba multiflora, Wall. Baker in Hook. f., Fl. Brit. Ind., vi, p. 202. A perennial herb, in distribution Assamo-burmese, in the Plains (in *Zone 1*) at Kobo in partial shade (37017), in the Hills (in *Zone 3*) at Janakmukh (37169), sterile in this place with bulbils, and therefore the determination somewhat doubtful.

Curcuma longa, Linn. Baker in Hook. f., Fl. Brit. Ind., vi, p. 214. The Turmeric or Haldi plant, a perennial herb widely cultivated through Asia and readily maintaining itself uncultivated in north-eastern India; in the Plains (in *Zone 1*) wild on the edge of the forest north of Sadiya (32651, 32652), where it flowers in August; leaves apparently of it were present at Pobamukh.

Curcuma amada, Roxb. Baker in Hook. f., Fl. Brit. Ind., vi, p. 213. A smaller plant than *C. longa*, in distribution in and around Bengal, with the flesh of the rhizome yellow instead of orange, but very like *C. longa* in other respects, found (in *Zone 1*) on the edge of forest north of Sadiya (32644).

Curcuma sp. A plant very like *C. longa* except that the flesh of the rhizome is white, found (in *Zone 1*) upon the bank of the Kundil river near Sadiya (32660, 32661). The coma of the inflorescence is big and purplish; the smell of the rhizome is as in *C. amada*.

Curcuma sp. A species with a red petiole is excessively common (in *Zone 1*) in the grass-land at Sadiya, spreading freely over the fallow fields. Unfortunately flowers could not be found at the time of my visits.

Hitchenia careyana, Benth. Baker in Hook. f., Fl. Brit. Ind., vi, p. 225. A perennial herb. 2 m. high and more, in distribution Assamese; found at the edges of openings in the forest at low levels, (No. 35714 was got at Makum); in the Hills, (in *Zone 3*) on the bank of the Janak stream, (in *Zone 4*) on both sides of the Dihang between Yambung and Puak or Yambung and Sissin bearing flowers in November.

Hedychium villosum, Wall. Baker in Hook. f., Fl. Brit. Ind., vi, p. 228. A perennial herb, frequently epiphytic, in distribution Assamese; in the Hill

(in *Zone 3*), over Renging camp (36708), and on the south face of Bapu at 3,000 ft. or 914 m. It was in flower in February.

Hedychium gardnerianum, Rosc. Baker in Hook. f., Fl. Brit. Ind., vi, p. 230. A tall perennial herb, in distribution Eastern Himalayan; in the Plains (in *Zone 1*), at Saikhoa (32637) with its fragment white flowers in August.

Hedychium stenopetalum, Lodd. Baker in Hook. f., Fl. Brit. Ind., vi, p. 231. A very tall perennial herb attaining 4 m., in distribution Assamo-burmese, growing at the edge of openings in the high forest; in the Hills (in *Zone 3*), at Balek, between Janakmukh and Aieng (37216), near Renging, (in *Zone 4*) under Rotung towards the Sireng river, and thence westwards at various points along the Dihang to Yambung, on "Signal Hill" over Yambung, at Pangi village, at 2,600 ft. or 792 m. over the Libang stream, and on the border of the swamp Ripshing-Sieng at 5,500 ft. or 676 m., in fruit in December.

Hedychium sp. A rather large herb with leaves rising to 1.25 m. whereof the blade makes $\frac{2}{3}$, being up to 95 by 17 cm. in dimensions. These leaves overtop the infructescence considerably; but that is made conspicuous by the brilliance of the red bracts which protect the white seeds. It was found in fruit only (in *Zone 3*) above Renging camp at 2,500 ft. or 762 m., and (in *Zone 4*) near the river Dihang upon the stream at Puak (37638) and near Yambung camp, in both these two latter places at 900 ft. or 274 m.

Amomum dealbatum, Roxb. Baker in Hook. f., Fl. Brit. Ind., vi, p. 239. A coarse herb, 2 m. high in distribution Assamo-burmese, common where the forest is broken as (in *Zone 1*) upon the bank of the Brahmaputra at Kobo and downwards to Pobamukh (37011), (in *Zone 3*) at Balek village where the Abors encourage it as they use the young shoots for a flavouring (36578) and above it, by the Janak stream, and at Renging camp, and (in *Zone 4*) by the Dihang from Rotung, over Rotung at 2,500 ft. or up to Yambung, on "Signal Hill" and on the edge of the clearings of Pangi village (37779) up to 3,800 ft. or 1,158 m. The Abors call it Tajah. It was in fruit at the time of the Expedition.

Zingiber roseum, Rosc. Baker in Hook. f., Fl. Brit. Ind., vi, p. 244. A perennial herb of moderate size, of peculiar distribution, *i.e.*, in the Circars-Chota Nagpur region and now in the Upper Assam, in the Plains (in *Zone 2*) at Pasihat (37113), not uncommonly.

Costus speciosus, Smith. Baker in Hook. f., Fl. Brit. Ind., vi, p. 249. A fairly large perennial herb, in distribution Indo-malaysian, in the Plains

(in *Zone 1*) at Sadiya and Kobo, and near the foot of Hills (*Zone 2*) at Paai-ghat sparingly.

Alpinia Allughas, Rosc. Baker in Hook. f., Fl. Brit. Ind., vi, p. 253. A perennial herb of moderate size, in distribution Indo-malaysian : in the Plains (in *Zone 1*) very common near the Brahmaputra river wherever the forest canopy is broken so as to let in light enough, as on the river bank and on path-sides. Away from the river it is less common and it was not abundant though present (in *Zone 2*) on the Pilung chapri : in the Hills it occurs (in *Zones 3 and 4*) on the banks of the Dihang here and there from Yambung down to Janakmukh; and on its tributaries up to 1,300 ft. or 396 m.

Alpinia malaccensis, Rosc. Baker in Hook. f., Fl. Brit. Ind., vi, p. 255. A big perennial herb, in distribution Indo-malaysian ; in the Plains (in *Zone 1*) at Sadiya on the edge of forest (32648) and in alleyways, and at Kobo, very common, with its berries, between cinnabar and brick-red in colour, ripe in August; in the Hills (in *Zone 3*), by the Sipi stream, and (in *Zone 4*) in the Dihang valley near the mouth of the Sireng and over the Libang stream.

Marantaceæ.

Phrynium capitatum, Willd. Baker in Hook. f., Fl. Brit. Ind., vi, p. 258. A perennial herb, in distribution Indo-malaysian and on the China coast, in the Plains (in *Zones 1 and 2*) common in forest even in deep shade, though there it neither flowers nor is vigorous ; No. 37045 was collected at Pobamukh ; in the Hills (in *Zones 3 and 4*) everywhere in the forest of the Dihang valley at low levels, and sometimes showing itself accommodating enough to grow on clearings that are damp : it was at 2,000 ft. or 610 m. and possibly higher on the clearings of Pangi village, flowering in December.

Phrynium parviflorum, Roxb. Baker in Hook. f., Fl. Brit. Ind., vi, p. 259. A perennial herb, in distribution Indo-malaysian, but brokenly so that it is almost Assamo-malaysian : in the Hills (in *Zone 3*) at Janakmukh (37167).

Musaceæ.

Musa aurantiaca, Mann ex Baker in Hook. f., Fl. Brit. Ind., vi, p. 263. A giant herb, but small for a *Musa*, in distribution Assamese, with brilliant orange bracts and dull yellow flowers, in the Plains (in *Zone 1*) to the north of Sadiya, (32654), in flower and in fruit in August, the seeds exposed

and birds pecking them off : in the Hills (in *Zone 3*) by the Sipi stream at 1,600 ft. or 488 m., in flower in January, (36582) in forest. The Abors called it Ko-dum.

Musa velutina, Wendl. & Drude. Baker in Hook. f., Fl. Brit. Ind., vi, p. 263. A giant herb, though small for a *Musa*, endemic, collected before by Mann in upper Assam, his locality not recorded, and by me at Makum (35722), with rose-red to pinkish magenta bracts and velvety fruit of the same colour which dehiscing into about six parts exposes black seeds in a thin white meal that birds eat ; in the Plains (in *Zone 1*) found at Sadiya, at Saikhoa (32638) and at Kobo.

Musa pruinosa, (King in Journ. Agri.-Hort. Soc. Ind., 2 Séc., v, 1818, p. 64, as a variety of *M. paradisiaca*). On plate IV figure A of this report are figured two wild bananas. The lower one with horizontal foliage I regard as feral *M. paradisiaca* ; the other, at the back, with obliquely ascending leaves is what I am here calling *M. pruinosa*. There is in my mind no doubt as to their specific difference ; but I am not able to examine for myself material named by Sir George King, and take the identity of the large Abor plant with it at second hand.

This large Abor plant suggests *M. nagensium*, Prain, but carries its fruit recurved, and so is strikingly different in this one respect : in size, waxiness, and other characters it agrees unless the colour within the bracts, which colour I forgot to note, is unlike. The Expedition used the leaves as thatch ; and the men building shelters became "dusty as millers" from the wax that particularly below coats them. I have earlier (p. 25) given some account of these leaves. The leaf sheaths that make the "stem" do not go as ragged at the edges as do those of the other lesser wild plantains and are coloured more claret than the brown of those of the lesser wild plantain. This claret colour extends to the midrib of the leaf at the back. The flowers are in two rows, fairly large and the free sepal is only half as long as it is in *M. paradisiaca*. The fruit is 12 to 13 cm. long on a stalk half as long and is bent through about 60 degrees about the point where it arises. It is packed with seeds each in a thin film of floury flesh. While less common than the lesser wild plantain is yet common enough, firstly (in *Zone 2*) from Lokpur over the gravels to Pasighat and to the base of the Hills ; then (in *Zone 3*) from Janakmukh (37172) near the Dihang (through to *Zone 4*) all the way to Yambung and by the tributaries of the river up to an elevation of 3,500 ft. or 1,067 m. The Abors call it Lumkong.

Musa paradisiaca, Linn. : subspecies *M. sapientum*, Linn., var. *Hookeri*, King : K. Schum. in Engl. Pflanzenreich, iv, 45, 1900, p. 21. Varieties and races of the cultivated plantain occur wild. This variety is a giant herb of the same

size as the cultivated plantain. The way in which it carries its leaves is seen from Plate IV figure A in this report, the plantains in the foreground being it : they arch. There is at times but not always a brownish colour on the midrib, otherwise the blade is of a pure green. Their sheaths are brown and get ragged by splitting about the edges. The fruit is full of seeds in a very little floury pulp. The Abors naturally have a distinctive name for it ; and with them while the cultivated plantain is Kopak, this wild one is Kolung. It grows on the Plains (in *Zone 2*) at Lokpur and Pasihat and in the Hills (in *Zone 3* and in *Zone 4*) more freely than the last up to an altitude of 3,600 ft. or 1,097 m. near streams. No. 37398 was collected near the Dihang under Rotung.

Musa paradisiaca, Linn., subspecies *M. sapientum*, Linn. The plantain is cultivated in the Assam valley, as everywhere in the tropics where conditions permit, and certain races of diverse merit have penetrated to Sadiya. There I was able to get the well-known Bengal Karsh-kela, and small table races with the names of Zati Kol (32545), Abor kol (32547), Manoha (32669) and Digjui (32670). The well known Mal-bhog and Athia kela were also there. Which of these the Abors also possess could not be ascertained, but they grow plantains near most if not all of their villages.

Hæmodoracæ.

Peliosanthes macrophylla, Wall. Hook. f., Fl. Brit. Ind., vi, p. 266. A perennial herb, relatively tall in its genus, in distribution Eastern Himalayan. In the Hills (in *Zone 3*) from 900 ft. or 274 m. to the summit of Bapu at 6,266 ft. or 1,910 m., at Renging (36635) and above Renging camp at 3,300 ft. or 1,006 m. (36271), (in *Zone 4*) at 900 ft. or 274 m. at the mouth of the Side river, to Yambung where in the gorge it grows in great quantity from 1,000 to 1,200 ft. or 305 to 366 m. (37758). It carried its bright blue berries in January, but most of the plants were sterile.

Peliosanthes violacea, Wall. Hook. f., Fl. Brit. Ind., vi, p. 266. A perennial herb, in distribution Assamo-malaysian growing in forest : in the Hills (in *Zone 3*) at Janakmukh at 1,200 ft. or 366 m., near Rammidambang in forest of *Vatica Shingkeng*, over Renging in oak forest at 2,300 ft. or 701 m. (37324), about the water-parting of the Serpo and Igar streams from 4,000 to 5,500 ft. or 1,219 to 1,676 m. (36189) and (in *Zone 4*) up to 3,300 ft. or 1,006 m., over Rotung at 4,500 ft. or 1,372 m. Its blue berries are duller than these of *P. macrophylla*, but produced at the same time. Both the varieties *Clarkei* and *minor* were present.

Peliosanthes Bakeri, Hook. f., Fl. Brit. Ind., vi, p. 267. A small herb, in distribution Assamo-burmese; in the Hills (in *Zone 3*) found in association with *P. macrophylla* at Renging (36635 bis).

Ophiopogon wallichianus, Hook. f., Fl. Brit. Ind., vi, p. 268. *Mondo japonicum*, Farwell, var. *wallichianum*. A perennial herb, in distribution Himalayo-burmese, in the Hills (in *Zone 3*) found in high forest upon a spur over Upper Renging camp at 4,400 ft. or 1,341 m. (36293), and again upon the summit of the crest at 5,100 ft. or 1,554 m., in fruit in January.

Ophiopogon intermedius, Don. Hook. f., Fl. Brit. Ind., vi, p. 269. *Mondo japonicum*, Farwell, var. *intermedium*. A perennial herb, in distribution Indo-malaysian; in the Hills (in *Zone 4*) found plentifully over the mouth of the Yamne river between 1,400 and 1,600 ft. or 427 and 488 m. (36160), with its bright blue fruit ripe in January.

Iridaceæ.

Belamcanda chinensis, Leman. Hook. f., Fl. Brit. Ind., vi, p. 277. A herb, in distribution Assamo-chinese, but Sir Joseph Hooker has suggested that it may not be indigenous in the Eastern Himalaya; in the Plains (in *Zone 1*) very common in grassland at Sadiya, and thence Griffith recorded it as in gardens in 1836 (*Trans. Agri.-Hort. Soc. India*, v. 1838, p. 133 and under the name *Sisirhynchium* in *Notulae*, 1. p. 116) flowering in August and September; in the Hills grown (in *Zone 3*) at Balek under the name of Bor-sha for use as (in *Zone 1*) an external medicament.

Amaryllidaceæ.

Agave Vera-Cruz, Mill. Drummond and Prain in Agric. Ledger, 1906, No. 7. p. 86: Brubl in Journ. As. Soc. Bengal, N. S. iv, 1908, p. 638. An American plant widely grown in India and now permanent. It is established (in *Zone 1*) at Sadiya.

Curculigo grandis, MS. in herb. Calc. A herb, in distribution Assamese, in the Hills (in *Zone 3*), at Janakmukh (36472), flowering in January.

Curculigo recurvata, Dryand. Hook. f., Fl. Brit. Ind., vi, p. 279. A tall herb, 2 m. high, in distribution Indo-malaysian and through south China, also to Australia, in the Hills (in *Zone 3*), on the edges of openings in forest at Janakmukh and by the river Dihang (37201), near Renging camp (36688, 36717), and over Renging camp at 3,200 ft. or 975 m. growing in a sheet, (in

Zone 4) in a forest of rather small trees over Rotung at 3,600 ft. or 1,097. Plentiful over the mouth of the Yamne river in the gorge of the Yambung stream, and near Pangî village. The rather lustreless yellow flowers were open in December.

Taccacææ.

Tacca laevis, Roxb. Hook. f., Fl. Brit. Ind., vi, p. 288. A rather large herb, in distribution Assamo-malaysian ; in the Hills (in *Zones 3 and 4*), found in the bottoms of valleys from near Janakmukh where it grows on the under-cliff all the way to Yambung along the course of the Dihang, and in the valleys of the following tributary streams,—Janak (37283), Serpo, Lalik, Igar and Yambung. Its greatest elevation was 2,700 ft. or 823 m. Its dark claret flowers were nearly over in December.

Dioscoreacææ.

Dioscorea Prazeri, Prain and Burkill in Journ. As. Soc., Bengal, lxxiii, 1904, suppl. p. 2; *D sikkimensis* Prain and Burkill, l. c. p. 3, *D. Clarkei*, Prain and Burkill, in Journ. As. Soc. Bengal, N. S. x, 1914, p. 15. A herbaceous climber, vegetative during the Rains, and perhaps a little before and a little after, in distribution Assamo-burmese, and into Lower Siam ; in the Hills (in *Zone 3*) found at Janakmukh (36601).

Dioscorea esculenta, (Lour.) Burkill. *D. spinosa*, Roxb.: Hook. f., Fl. Brit. Ind., vi, p. 291. *D. aculeata*, Linn. in 1754 : Prain and Burkill in Journ. As. Soc. Bengal, N. S. x, 1914, p. 19. A climbing herb, in cultivation in the Eastern Tropics, and certainly of origin within them, wild at times persisting from cultivation, and perhaps wild without any help from man in eastern Malaya ; in the Plains (in *Zone 1*), in cultivation at Sadiya, both as Moa-alu and as China-alu. These have small thorns among the roots, and so are the variety *spinosa*.

Dioscorea bulbifera, Linn. Prain and Burkill in Journ. As. Soc. Bengal, x, 1914, p. 26 : *D. sativa*, Linn. in part : Hook. f., Fl. Brit. Ind., vi, p. 295. A climbing herb, of vegetative activity in the Rains, in distribution Indo-pacific, and in var. *latifolia* in Africa and introduced into the Tropics of America, in the Plains (in *Zone 1*) at Sadiya (32657), and at Saikhoa not common (32629, 32630), in flower in August.

Dioscorea pentaphylla, Linn. Hook. f., Fl. Brit. Ind., vi, p. 289. Prain and Burkill in Journ. As. Soc. Bengal, N. S. x, 1914, p. 23. A herbaceous

climber, with short vegetative period, in distribution Indo-malaysian and to the Pacific, and in southern China ; in the Plains (in *Zone 1*), as var. *communis*, at Sadiya, Saikhoa, and at Kobo upon the top of the bank of the Brahmaputra (37010) ; in the Hills (in *Zone 4*) at 1,000 ft. or 305 m. upon a clearing near Rotung as if cultivated (37536). Unfortunately the attempt made to bring this apparently cultivated race of *D. pentaphylla* under observation in the Royal Botanic Gardens, Calcutta, failed, as the tuber sent down did not grow.

Dioscorea anguina, Roxb. Hook. f., Fl. Brit. Ind., vi, p. 293 : Prain and Burkill in Journ. As. Soc. Bengal, N. S. x, 1914, p. 32. A herbaceous climber, vegetative during the Rains, in distribution Indo-malaysian, in the Plains (in *Zone 1*), in forest near Sadiya and at Kobo (35910).

Dioscorea, sp. Perhaps a cultivated race of *D. glabra*, Roxb. or of *D. trinervia*, Roxb., in the Hills (in *Zone 4*), at 3,500 ft. or 1,067 m. upon the clearings of Pangi village trained up posts (37772) ; and (in *Zone 3*) at Balek (36453) where the Abors gave it a name written by my collector "Gnijing" which probably is meant for the Je-ngin of Lorraine's Dictionary. It has foliage that dries reddish, and in that the leaf-blade is a trifle thick for Indian *D. glabra* suggests *D. trinervia* most. If at some time the inflorescence can be obtained this doubt will be at once cleared up.

Dioscorea Wattii, Prain and Burkill in Journ. As. Soc., Bengal, N. S. iv, 1908, p. 457 and x, 1914, p. 35. A wide-climbing herb, in distribution Assamese, in the Plains, very common (in *Zone 1*) in the forest about Kobo (35912), in the Hills (in *Zones 3 and 4*) up to 2,500 ft. or 762 m. commonly, but for the most part not close to streams, where *D. lepcharum* was more likely to occur. At Rotung it occurred on the crest of the gorge (36055). Its greatest elevations were at 2,500 ft. or 762 m. on a clearing to the south of the Libang stream at 2,300 ft. or 701 m. south of Rotung and at 2,100 ft. or 640 m. near Kebang. Ripe fruits were found in January and new leaves were got in December and January : there seems to be no winter rest in this species. The Abors of Balek at which village it grows, stated that they do not eat its tubers.

Dioscorea lepcharum, Prain and Burkill in Journ. As. Soc. Bengal, x, 1914, p. 36. A herbaceous climber, vegetative during the Rains, in distribution Assamo-burmese, climbing to about 10 m., with the end of its season in November, and then producing numerous curiously shaped bulbils, in distribution Assamo-burmese ; in the Plains (in *Zone 1*) very common near water at Sadiya (32666, 35795), Saikhoa (35769), Kobo (35905, 36906), and (in *Zone*

2) the same at Pilung, Lokpur (38202) and Pasighat; in the Hills (in *Zone 2*) near Renging camp at nearly 2,000 ft. or 610 m. and (in *Zone 4*) abundantly upon the bank of the Dihang between Yambung and Sissin, and elsewhere on steep slopes under Signal Hill over Yambung (37686), and over the Igar stream. At Renging the ground was full of the holes that the villagers had made in digging for the tubers; probably they eat it regularly but perhaps they had to use more of it in 1911 than usual, as Renging village was the first to suffer from the blockade set up after the Abors had murdered Mr. Williamson and Dr. Gregorson with their party in the previous May. The Miris in the Plains eat it under the name of Mai-yong or Mai-ong. A young plant from towards Aieng (36463) (in *Zone 3*) is thought to be of this species.

Dioscorea sp. near *D. lepcharum*, Prain and Burkill. A herbaceous tuberous climber with slender stems, and foliage that suggests *D. bulbifera* but the root places it in the section *Enantiophyllum*. The leaves are thin and silvery below, deltoidly cordate, in dimensions up to 13 by 12 cm. Probably this species whatever it be, is not uncommon in the Abor Hills, but was resting at the time of the Expedition. Its new shoots were found (in *Zone 1*) at Kobo in March, and (in *Zone 4*) its old shoots on the bank of the Dihang under Rotung at 700 ft. or 213 m. under Rotung in December (37506). It was found also at 2,500 ft. or 762 m. towards Kalek upon clearings in December (37580).

Dioscorea glabra, Roxb. Hook. f., *Fl. Brit. Ind.*, vi, p. 294. Prain and Burkill in *Journ. As. Soc. Bengal, N. S.* x, p. 37. A herbaceous climber, in distribution Himalayo-burmese, with an extension beyond the Bengal plains in the Chota Nagpur region, and reaching Tenkin and the northernmost Malay States. It was found (in *Zone 1*) at Sadiya in plenty (32667), at Saikhoa (32696) and near Kobo in the long grass of the Kemi chapri (37082).

Dioscorea sp. A species which occurs in the Khasia Hills at Cherrapunji, and is yet unnamed because it has been found sterile only; in the Hills (in *Zone 3*) at Janakmukh at 700 ft. or 213 m. and (in *Zone 4*) on "Signal Hill" over Yambung at about 2,000 ft. or 610 m. (37713). At Janakmukh it was observed to root from the lower nodes of the trailing stem.

Dioscorea alata, Linn. Hook. f., *Fl. Brit. Ind.*, vi, p. 296: Prain and Burkill in *Journ. As. Soc. Bengal, N. S.* x, 1914, p. 39. A climbing herb, of Asiatic origin, but now cultivated all round the Tropics in very many races; in the Plains (in *Zone 1*) cultivated at Sadiya, in the Hills (in *Zones 3 and 4*) cultivated by the Abors, doubtless in all their villages. The race found at Rotung was white-fleshed (37537), but only immature tubers

were obtainable as the Abors had harvested all that was mature. At Balek (36452) the name used by the Abors was Alu, which is evidently represented in Lorraine's Dictionary by Ali; this word is from the Assamese, and suggests a recent acquisition of the yam.

Roxburghiaceae.

Stemona tuberosa, Lour. Hook. f., Fl. Brit. Ind., vi, p. 298. A herbaceous climber of forest, in distribution Assamo-chinese with an extension beyond the Bengal Plain in the Circars; in the Plains (*Zone 1*), at Kobo, near the banks of the Brahmaputra, in the Hills (*Zone 4*) near the banks of the Dihang at the mouth of the Side river, and of the Yambung stream, in scrub near Rotung village and near Kebang village, and on the clearings of Rotung, Pangi and above the Libang stream. It was in new vigorous growth in November.

Liliaceae.

Smilax parvifolia, Wall. Hook. f., Fl. Brit. Ind., vi, p. 304. A woody climber, in distribution Himalayo-assamese, in the Hills (*Zone 4*) found upon a "Razor-edge" ridge above Upper Renging camp in oak forest at 4,400 ft. or 1,341 m. (36297), and again in an exactly similar spot at 5,500 ft. or 1,676 m. upon the summit of the same hill.

Smilax odoratissima, Blume. *S. aspericaulis*, Wall. Hook. f., Fl. Brit. Ind., vi, p. 306. A woody climber, in distribution Assamo-malaysian, in the Hills (*Zone 3*) at the head of the Sirki stream at 1,800 ft. or 549 m. (36585), (*Zone 4*) in woody vegetation at 800 ft. or 244 m. close to Yambung camp (37699), at 3,000 ft. or 914 m. above the Igar stream in deep forest (36112), and upon the hills immediately over Upper Rotung at 4,500 ft. or 1,372 m., close to the crest in several places (38197). The Abors called it Relink.

Smilax lanceaefolia, Roxb. Hook. f., Fl. Brit. Ind., vi, p. 308. A woody climber, in distribution Assamo-burmese and on the China coast, in the Hills (*Zone 3*) in the neighbourhood of Janakmukh and (through to *Zone 4*) to 4,000 ft. or 1,219 m. on the edge of the clearings of Pangi village (37782) where it is plentiful. About Renging (*Zone 3*) it was also plentiful in a noteworthy way (36252, 36620) from 2,000 to 3,300 ft. or 610 to 1,006 m. Its young foliage and downwardly directed flowers are both touched with bronze-green; the flowers were produced in January.

Smilax quadrata, A. DC. Hook. f., Fl. Brit. Ind., vi, p. 308. A woody climber, in distribution Assamo-burmese, found (in *Zone 4*) upon a clearing over the Libang stream at 2,400 ft. or 732 m. (37736).

Smilax megacarpa, A. DC. Hook. f., Fl. Brit. Ind., vi, p. 311. A big woody climber, in distribution Assamo-malaysian; in the Plains (in *Zone 1*) found at Kobo, in the Hills, (in *Zone 4*) by the Dihang at the mouth of the Sireng river abundantly, near the Libang stream at 2,100 ft. or 640 m. among clearings, and over the head of the Igar stream at 3,600 ft. or 1,097 m., climbing through oak forest (36181). It carried berries in January.

Smilax Griffithii, A. DC. Hook. f., Fl. Brit. Ind., vi, p. 313. A woody climber, in distribution Assamese, perhaps endemic, for it is not known exactly where Griffith got the type specimen, and it may have been in the Mishmi Hills; in the Hills (*Zone 4*) at 2,800 ft. or 854 m. above Upper Rotung (36826).

Heterosmilax indica, A. DC. Hook. f., Fl. Brit. Ind., vi, p. 314. A slender woody climber, in distribution Assamo-burmese, in the Plains, (in *Zone 1*) by the Brahmaputra at Kobo commonly (35912), and at Pobamukh (37040), with green berries in November.

Polygonatum brevistylum, Baker. Hook. f., Fl. Brit. Ind., vi, p. 319. A perennial herb, in distribution Eastern Himalayan, growing to 35 m. in height (in *Zone 3*) at an elevation of 5,100 ft. or 1,554 m. on the waterparting between the Serpo and Lalik streams (36353).

Polygonatum oppositifolium, Royle. Hook. f., Fl. Brit. Ind., vi, p. 320. A perennial herb, in distribution Assamo-burmese, its western limits in Nepal, found (in *Zone 3*) on the summit of Bapu at 6,266 ft. or 1,910 m. (36560), with red berries at the end of January.

Polygonatum Cathcartii, Baker. Hook. f., Fl. Brit. Ind., vi, p. 320. A perennial herb in distribution Assamese, in the Hills (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1,910 m. (36937).

Tovaria fusca, Baker. *Smilacina fusca*, Wall. Hook. f., Fl. Brit. Ind., vi, p. 323. A perennial herb, in distribution Assamese, with its western limit in Central Nepal; in the Hills (in *Zone 3*) upon the summit of Bapu at 6,266 ft. or 1910 m. (36561), without flowers at the end of January.

Tupistra Clarkei, Hook. f., Fl. Brit. Ind., vi, p. 325. A perennial herb, in distribution Eastern Himalayan, in the Abor Hills usually, found near streams

in forest but not always, in the Hills (in *Zone 4*) near the mouth of the Side river, at the mouth of the Yambung stream and in the greatest profusion on the hillside above the mouth, upon a hill south of the Libang stream at 2,800 ft. or 853 m. on a bank over a dry stream bed (37741), and on a spur above Upper Renging camp at 3,300 ft. or 1,006 m. in oak forest.

Tupistra veratrifolia, Kurz ex Dunn in Kew Bull. 1920, p. 344. A perennial herb, in distribution Assamese, in the Hills (in *Zone 3*) fairly common at Janakmukh (37281), in fruit in December.

Allium ascalonicum, Linn. Hook. f., Fl. Brit. Ind., vi, p. 337. The Shallot, widely cultivated in the Hills; (in *Zone 3*) seen in cultivation at Balek (36446) where the Abors call it Di-lap or Ta-lap.

Pleomele angustifolia, N. E. Br. *Dracaena angustifolia* Roxb. Hook. f., Fl. Brit. Ind., vi, p. 327. A shrub, in distribution, Assamo-malaysian, and to Australia; in the Plains (in *Zone 1*) plentiful in dense shade at Kobo (35933), in the Hills (in *Zone 3*) between Janakmukh and Aieng (37238), over Renging camp to 3,500 ft. or 1,067 m. (in *Zone 4*) in plenty near Kalek, over the mouth of the Yamne, near Yambung and over the Libang stream.

Pleomele petiolata, N. E. Br. *Dracaena petiolata*, Hook. f., Fl. Brit. Ind., vi, p. 331. A shrub, in distribution Eastern Himalayan, and as yet known but from the Daphla, Abor and Mishmi Hills, in the Plains (*Zone 1*) common at Sadiya according to Gammie (*Records Bot. Survey India*, 1. p. 71), in the Hills (in *Zone 4*) a rare plant at Puak at 900 ft. or 274 m. (37629).

Disporum pullum, Salisb.: Hook. f., Fl. Brit. Ind., vi, p. 360. A perennial herb in distribution Himalayo-malaysian and up the east of China to Japan, in India it has an extension across the Bengal plain in Chota Nagpur, in the Hills (in *Zone 3*) in shade at Renging camp (36694), over Renging camp at 3,300 ft. or 1,006 m. (36274), and (in *Zone 4*) at Rotung at 1,400 ft. or 427 m. (37359).

Paris polyphylla, Smith. Hook. f., Fl. Brit. Ind., vi, p. 362. A herb with a doubtful resting period, in distribution Himalayo-burmese and through China, in the Hills, growing to 75 m. high (in *Zone 3*) on the south face of Bapu at 5,000 ft. or 1,524 m. (in *Zone 4*) in the deep shade of dense oak forest on the hillsides at the head of the Igar stream from 3,200 to 3,400 ft. or 975 to 1,036 m. (36098), and over Rotung at 4,300 ft. or 1,311 m. In January it was coming into new leaf and flower; and at the same time berries could be found on late plants.

Commelinaceae.

Polia aclisia, Hassk. Hook. f., Fl. Brit. Ind., vi, p. 367. A rather large herb, in distribution Assamo-malaysian and in Tonkin, in the Hills (in *Zone 3*) in forest at Renging (36640), and (in *Zone 4*) over Upper Rotung at 4,100 ft. or 1,250 m. (38192), its metallic dark blue berries ripe in December.

Polia subumbellata, C. B. Clarke. Hook. f., Fl. Brit. Ind., vi, p. 368. A herb of moderate size, in distribution Assamese, in the Plains (in *Zone 1*) in deep shade at Kobo, carrying its metallic black berries in November and December (37018, 37074), (in *Zone 2*) at Behrung and at Pasighat, in the Hills (in *Zone 3*) in forest of *Vatica Shingkeng* at Rammidambang and over Renging, and (in *Zone 4*) on the hills over Rotung at 3,600 ft or 1,097 m.

Commelina obliqua, Ham. Hook. f., Fl. Brit. Ind., vi, p. 372. A herb nearly 1 m. high, in distribution Indo-malaysian, in the Plains (in *Zone 1*) at Kobo under heavy shade (37019), in the Hills (in *Zone 4*) at Yambung (37714) and doubtfully also on a clearing at Ponging.

Ancilema malabaricum, Merrill. *A. nudiflorum*, R. Brown. : Hook. f., Fl. Brit. Ind., vi, p. 378. A small herb of wet turf, and doubtless for the reason that such is absent in the Hills not found there, in distribution Indo-malaysian, in the Plains (in *Zone 1*) recorded as a plant of Sadiya by Gammie (*Records Bot. Survey India*, 1. p. 71); common at Saikhoa (35770); also on the Kemi chapri sparingly (38119).

Forrestia Hookeri, Hassk. Hook. f., Fl. Brit. Ind., vi, p. 384. A herb, in distribution Assamese, in the Plains (in *Zone 1*) as a herb 1.25 m. high at Kobo (35716), with its orange-red seeds conspicuously exhibited in the dense forest in December, and (in *Zone 3*) in forest near Renging camp at 2,400 ft. or 732 m. (36256) growing 60 cm. high with downwardly directed fruits in January.

Forrestia glabrata, Hassk. : Hook. f., Fl. Brit. Ind., vi, p. 384. A herb, in distribution Assamo-malaysian, in the Plains (in *Zone 4*) in forest at Kobo (35992), in flower in December.

Streptolirion volubile, Edgew. Hook. f., Fl. Brit. Ind., vi, p. 389. A herbaceous climber, in distribution Himalayo-chinese, in the Hills (in *Zone 3*) on a dry ridge on the south face of Bapu at 4,800 ft. or 1,463 m. (in *Zone 4*) on the edge of forest over Rotung at 2,700 ft. or 823 m., at the top of the clearings of Babuk village at 3,400 ft. or 1,036 m. in a spot which had not been cleared for some years (37650), and on the edge of the clearings of Pangi village at 3,800 ft. or 1,158 m., in flower at the commencement of January.

Floscopa scandens, Lour. : Hook. : f., Fl. Brit. Ind., vi, p. 390. A half-sprawling herb, in distribution Indo-malaysian and to Australia, in the Hills probably not uncommon but not in its growing period at the time of the Expedition, (in *Zone 4*) found withered on the clearings of Ponging, and in one spot on those of Rotung.

Juncaceae.

Juncus bufonius, Linn. Hook. : f., Fl. Brit. Ind., vi, p. 392. A small herb, in distribution through the north temperate regions and extending into India from the north, thrusting itself as it were onto the plains, in the Plains (in *Zone 1*) as a wood in the bed of the river Brahmaputra at Pobamukh (38234), in flower in March.

Palmae.

Pinanga gracilis, Blume. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind., vi, p. 407. A relatively small palm, in distribution Assamo-burmese ; in the Plains (in *Zone 1*) very abundant about Sadiya under the shade of *Terminalia myriocarpa* and quite a feature of the forest, common also at Kobo, and plentiful (in *Zone 2*) at Pasighat. I suspect that it is the palm which Griffith called "Areca parva" and "small Areca" in his *Journal* (pp. 35 and 41) stating it to be plentiful at the entrance to the Mishmi Hills. In the Hills (in *Zones 3 and 4*) on the gravels just south of Janakmukh in the Igar valley, over the mouth of the Yamne river, and sporadic about the valleys of the Serpo and Lalik streams, ascending to 3,000 ft. or 914 m.

Pinanga sp. A stemless palm with leaves up to 2.5 m. high found at 2,000 ft. or 610 m. (in *Zone 4*) in the Lalik valley (36241).

Wallichia densiflora, Mart. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind., vi, p. 419. A relatively small palm, in distribution Himalayo-assamese, in the Hills, not uncommon in forests especially towards 3,000 ft. or 914 m., but occurring from 700 ft. or 213 m. upwards (in *Zone 3*). It was at Janakmukh (37204), at the bottom of the Serpo valley in forest over Renging camp, and in *Zone 4*, by the mouth of the Side river, on the hillface over the Yambung stream in the gorge, and in the Lalik valley, all these elevations small, on the "razor-edge" ridge between the Lalik and Igar stream, over Rotung, and over Babuk from 3,000 to 3,700 ft. or 914 to 1,128 m. The flowers were open in December.

Arenga pinnata, (Wurmb.) Merrill. *A. saccharifera*, Labill. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind., vi, p. 421. A considerable palm, in distribution

Assamo-malayan, and in the Liu-kiu islands ; in the Plains (*Zone 1*) sparingly at Kobo, and in some plenty (in *Zone 2*) about Pilung, Lokpur and Pasighat : in the Hills, (in *Zone 3*) in some quantity about Janakmukh, and at 2,000 ft. or 610 m. over Balek, in the Serpo valley and over Renging camp, (in *Zone 4*) in the valleys of the Lalik and Igar streams up to 3,400 ft. or 1,036 m., at Ponging one tree, in the hills over Rotung, at Pangi one tree and north of Pangi (37790). The Abors call it Ta-she, Ta-shat and Ta-man ; in Lorraine's Dictionary is found the name To-mak.

Caryota urens, Linn. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 422. A fairly tall palm, in distribution Indo-malaysian, in the Plains (in *Zone 1*) common at Sadiya.

Livistona jenkinsiana, Griff. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 435. A considerable palm, but not as cultivated by the Abors, in distribution Assamese ; in the Hills, grown (in *Zones 3 and 4*) for thatching by the villagers of Balek, and Kebang and doubtless at other villages. The biggest plantation was found in the top of the gorge of the Yambung stream, the plants being 4 m. high, of which the petioles made 2 m. (37763), but yet that plantation was very small suggesting that it is not much resorted to. It is called Ta-uk.

Calamus erectus, Roxb. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 438. A rather short rattan, in distribution Assamo-burmese ; with stems only 3-4 m. long, but the flagellate leaves add another 4. m. to the total height of the plant. The Abors of Ponging and elsewhere use them for thatch, in the Plains (*Zone 2*) at Pasighat, and northwards and towards Pasighat, in the Hills (*Zone 3*) at Balek at Janakmukh (37127) commonly as at 3,000 ft. or 914 m. over Renging (to *Zone 4*) up the valley of the Dihang to Yambung at low elevations, and rarely high up as at 4,700 ft. or 1,433 m. over Rotung. Some difference must be made in its abundance in the Hills by the Abors' use of it. The thatching cane of the Abors is called Ta-ra.

Calamus flagellum, Griff. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 439. A rather short rattan, in distribution Assamo-burmese, with flagellate leaves which may be almost 7 m. long, (in *Zone 3*) in the Hills near their base at Balek (36863, 36884) and on a tributary of the Shile stream at 1,600 ft. or 488 m. (36584).

Calamus leptospadix, Griff. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 441. A suberect rattan of low growth, in distribution Assamo-burmese ; in the Plains, (*Zone 1*) common near the Brahmaputra at Sadiya and at Kobo (37035, 36882), chiefly upon the edges of forest, and also at Pobamukh.

(and Zone 2) about Pilung, in the Hills, just (in Zone 3) between Balek and Janakmukh. It was always flowerless, and once with overmature fruits.

Calamus floribundus, Griff. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 444. A rattan, in distribution Assamese, in the Plains (Zone 1) near the Brahmaputra about Kobo and Pobamukh (35741, 37036, 37041). It comes into flower in December.

Calamus sp. near *C. floribundus*, Griff. but notable for the extremely acuminate apex of its leaflets, in the Hills (Zone 3) about the summit of Bapu from 5,400 ft. or 1,646 m. to the very top at 6,266 ft. or 1,910 m. (36922). There are two rattans on the upper slopes of Bapu, and in March the ground was littered with fruits from them torn off and torn open by birds or squirrels.

Calamus acanthospathus, Griff. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi. p. 448. A rattan of moderate size, in distribution Assamo-burmese, in the Hills, (Zone 3) on Bapu at 5,400 ft. or 1645 m. and up to 6,200 ft. just under the summit (36542, 36921), and above Renging camp from 2,800 ft. or 853 m. to a crest at 5,100 ft. or 1,554 m. (36335), climbing the forest trees to a height of about 25 m. with the diameter of the ensheathed cane about 6.5 cm.

Calamus gracilis, Roxb. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 453. A slender rattan, in distribution Assamese; (in Zone 2) in the Plains, plentiful by the Dihang at Pasighat and by the Sirin stream near the foot of the Hills, in the Hills (in Zone 3) at Janakmukh and Aieng (37234), north of Janakmukh towards Rammidambang (36391), plentiful again on rocky hill-crests and steep slopes and associating with *C. acanthospathus* at 5,100 ft. or 1,554 m. on a crest over Renging camp and also (in Zone 4) on the "Razor-edge" ridge between the Lalik and the Igar valleys (38167). It was getting out of flower at the end of February.

Cocos nucifera, Linn. Becc. & Hook. f., in Hook. f., Fl. Brit. Ind. vi, p. 482. The Coconut palm, of very uncertain origin, formerly thought to be Pacific, later American, but either view is open to contestation, now world-wide in cultivation through the Tropics where moisture is adequate; in the Plains, (Zone 1) cultivated at Sadiya, but not by the Abors, who, states Lorraine, use the Assamese word *Nariko* to denote a Coconut.

Pandanaceae.

Pandanus furcatus, Roxb. var. *macrocarpus*, Martelli MS. As a small tree 8 to 12 m. high, always sporadic, but plentiful from the edge of the

Plains (*Zone 2*) on the side of the Sirin stream north of Pasighat, and near Aieng (37242), (through *Zones 3 and 4*) up the Dihang valley as far as explored and ascending the Hills to 5,100 ft. or 1554 m. over Renging and over Rotung. It was in fruit in December. The Abors call it Ta-kaw.

Araceae.

Arisaema petiolulatum, Hook. f., Fl. Brit. Ind. vi, p. 498. A perennial herb with a limited period of vegetative activity, in distribution Assamese, in the Hills (in *Zones 3 and 4*) growing in high forest over Renging camp and at 2,300 ft. or 701 m. in the Lalik valley (37340).

Arisaema Listeri, Prain MS. in Herb Calc. A perennial herb of limited vegetative activity, in distribution Eastern Himalayan, in the Hills (*Zone 3*) upon the south face of Bapu at 2,300 ft. or 701 m. in oak forest (36907), and thence upwards not uncommonly (No. 36912 at 4,200 ft. or 1,280 m.). It is an earlier plant than *A. concinnum*, and in February was finishing its flowering.

Arisaema tortuosum, Schott. Hook. f., Fl. Brit. Ind. vi, p. 502. A perennial herb with a limited period of vegetative activity, in distribution Indo-burmese; in the Hills (*Zone 3*) at 5,500 ft. or 1,676 m. on the waterparting between the Serpo and Igar streams (36207).

Arisaema concinnum, Schott. Hook. f., Fl. Brit. Ind. vi, p. 505. A perennial herb with a limited period of vegetative activity, in distribution Himalayo-assamese; in the Hills, chiefly between 1,300 and 2,300 ft. or 396 and 701 m. (in *Zone 3*) above Balek at 2,300 ft. or 701 m. (36908) (in *Zone 4*) at Rotung (38176), above Rotung at 2,000 ft. or 610 m. but also upon the hill crest at 5,500 ft. or 1,676 m. over the Igar. It came into flower in March.

Typhonium trilobatum, Schott. Hook. f., Fl. Brit. Ind. vi, p. 509. A perennial herb of limited vegetative activity, in distribution Indo-malaysian; in the Plains (*Zone 1*) recorded as a plant of Sadiya by Griffith (*Notulae*, p. 198) under the name of *Arum orixense*. He got it in July.

Amorphophallus bulbifer, Blume. Hook. f. Fl. Brit. Ind. vi, p. 515. A perennial herb with a limited period of vegetative activity, in distribution Indo-burmese; in the Hills, not uncommon at and above 3,000 ft. or 914 m. (in *Zone 3*) around Bapu, over Renging and (in *Zone 4*) over the Igar stream and Rotung.

Stuednera discolor, Hort. Bull. Hook. f., Fl. Brit. Ind. vi, p. 520. A perennial herb; endemic; in the Hills (in *Zone 4*) in the gorge of the Dihang under Rotung at 1,000 ft. or 305 m. on the sunless hillface (37378). The lower surface of the leaves is variegated with the deepest purple in a large symmetrical pattern, and I venture to suggest that Griffith's "*Arum foliis pulchre nigro-tinctis*" (*Journal* 1. p. 27) got at the Brahmakund, is this plant.

Stuednera capitellata, Hook. f., Fl. Brit. Ind. vi, p. 521. A perennial herb, in distribution Assamo-burmese; in the Hills (in *Zone 3*) in deep shade very common at Janakmukh on slopes which facing north get in December no sun (37280), at Renging and above commonly to 4,000 ft. or 1,219 m., at Balek at 1,400 ft. or 427 m. (30896), and at 2,400 ft. or 732 m., and (in *Zone 4*) in shade by the Side stream.

Colocasia esculentum (Linn.) Schott. *C. antiquorum*, Schott. Hook. f., Fl. Brit. Ind. vi, p. 523. A perennial herb, very widely cultivated through the Tropics and wild in India; in the Plains (in *Zone 1*) a cultivated race of this species is grown at Sadiya, as generally through Assam (32694, 32695), and on the edge of clearings a different smaller leaved race may be found wild (32653); in the Hills, a small-leaved wild race or variety is very common, along the course of the Dihang just above upper flood limit everywhere (in *Zones 3 and 4*) between Janakmukh and Yambung (No. 37634 from Puak represents it), while on the clearings there is a very large race or variety, with leaves sometimes 60 cm. long; it likes damp places and was found particularly above Babuk at 3,100 ft. or 945 m. (37669), but also in many places between the elevations of 700 ft. or 213 m. at Janakmukh and 3,600 ft. or 1,097 m. At Janakmukh it was on the edge of the cliff over the river, it was on the banks of the Side, Serpo and Yambung streams, and on the clearings of Renging, Rotung, Kalek, Babuk and Pangi. This big leaved race or variety was not seen on the Plains.

Alocasia macrorrhiza, Schott. Hook. f., Fl. Brit. Ind. vi, p. 526. A big herb, widely cultivated in the Tropics, and wild also in the East, in the Plains (*Zone 1*) cultivated about Sadiya abundantly.

Alocasia fallax, Schott. Hook. f. Fl. Brit. Ind. vi, p. 527. A perennial herb, in distribution Assamo-burmese, a forest aroid very quick to take advantage of any interference with the overhead canopy which lets light to the ground but not wind or other dessicating influences, in the Plains common (in *Zone 1*) in the alleyways of the forest at Sadiya (35784, 3578) and Kobo, on the other hand rare where the big species of *Vitis* make the canopy dense; commoner (in *Zone 2*) in the forest of *Terminalia myriocarpa* between Pilung

and Pasighat, in the Hills (in *Zones 3 and 4*) abundant about the edges of clearings everywhere, and, as well, never absent from any square mile of forest up to 2,500 and 3,000 ft or 762 and 914 m., and even up to 3,200 ft. or 975 m. over Rotung. It was found at Yambung and Fangi, and obviously extends further back into the hills. Its brilliantly orange berries are ripe in December, and make one of the attractions of the undergrowth.

Colocasia ? Mannii, Hook, f. in Fl. Brit. Ind. vi, p. 524. A tuberous herb, in distribution Assamese, found in August (in *Zone 1*) at Sadiya (32688) with ripe fruit in which condition unfortunately the characteristic spadix existed no longer.

Aglalonema hookerianum, Schott. Hook, f., Fl. Brit. Ind. vi, p. 529. A large more or less herbaceous climber, in distribution Assamese, with its southward limit beyond Chittagong in Arakan ; in the Plains (*Zone 2*) exceedingly common in the forest of *Terminalia myriocarpa* on the Pleistocene gravels between Pilung and Pasighat, in fact in greater abundance than anything else except perhaps the *Terminalia* (37114) : in the Hills (in *Zone 3*) near Renging camp (36623).

Scindapsus ? A climbing herb on tree-trunks or rocks found (in *Zone 3*) from Janakmukh to the Serpo valley, and the hills above to Renging camp at 4,000 ft, or 1,219 m., common (37196), sterile only.

Rhaphidophora grandis, Schott. *R. eximia* Schott. Hook. f., Fl. Brit. Ind. vi, p. 547. A big half-herbaceous climber, in distribution Himalayo-assamese, in the Hills, usually climbing up tree trunks, but sometimes on rocks, (in *Zone 3*) in the Abor Hills from Janakmukh (37191), the whole way up the Dibang valley (through *Zone 4*) abundantly to Yambung and doubtless further and ascending the hills in less abundance to the summit of Bapu at 6,266 ft. or 1,910 m. The Abors call it Bauw-eh.

Rhaphidophora Hookeri, Schott. Hook. f., Fl. Brit. Ind. vi, p. 546. A big half-herbaceous climber, more epiphytic than not, in distribution Assam-burmese, and just crossing the border from Burma to China ; in the Plains (in *Zone 1*) best developed on the edges of alleyways very common from Kobo (37016) to (*Zone 2*) Lokpur, Pilung and Pasighat, No. 37114 from Pilung being a young condition in the Hills, common at low elevations, e. g. (in *Zone 3*) Janakmukh, Rammidambang (37499), Balek at 1,400 ft. or 427 m. (39991), (in *Zone 4*) at the mouth of the Sirong (37393) and at Yambung. In flower in January.

Rhaphidophora decursiva, Schott. Hook. f., Fl. Brit. Ind. vi, p. 547. A big half-woody climber, in distribution Indo-burmese but somewhat irregular; in the Hills (in *Zone 4*) in the gorge at Rotung at 1,200 ft. or 366 m. (36051).

Rhaphidophora glauca, Schott. Hook. f., Fl. Brit. Ind. vi, p. 547. A big half-herbaceous half-epiphytic climber, in distribution Assamo-burmese, with its western limits in Central Nepal, in the Plains (*Zone 1*) at Kobo in dense shade (35997), and (in *Zone 2*) from Pilung to Pasighat, but less commonly than *R. Hookeri*.

Lasia spinosa, (Linn.) Thw. *L. heterophylla*, Schott. Hook. f., Fl. Brit. Ind. vi, p. 550. A herb, in distribution Assamo-malaysian, trespassing by virtue of its aquatic habitat onto the Bengal Plains, and with an extension to Chota Nagpur, and in Tonkin, in the Plains (*Zone 1*) found by Gammie at Sadiya (*Records Bot. Survey India*, 1. pp. 69, 86), (in *Zone 2*) at Lokpur and between Pilung and Lokpur (38201) and at Pilung, rare. In flower in March.

Pothos scandens, Linn. Hook. f., Fl. Brit. Ind. vi, p. 551. A big half-woody climber, in chief part epiphytic, in distribution Indo-malaysian, in the Hills (*Zone 3*) at Renging (36664).

Pothos Cathcarti, Schott. Hook. f., Fl. Brit. Ind. vi, p. 552. A very large half-herbaceous climber for the chief part epiphytic, in distribution Himalayo-burmese and just into China, in the Plains (*Zone 2*) collected at Pasighat (37448).

Pothos vrieseanus, Schott. Hook. f., Fl. Brit. Ind. vi, p. 552. A big half-woody climber, in chief part epiphytic, in distribution Assamo-malaysian, in the Plains (*Zone 1*) common from Kobo and Pobamukh (37039), (*Zone 2*) to Pasighat, and northwards into the Hills: in the Hills, (*Zone 3*) at Janakmukh (37120) and on to Renging, rarely in flower and depending upon some accidental opening up of the forest to attain its full development; flowers were found in December. Engler (*Pflanzenreich* IV. 23 B. 1905, p. 23) takes the view that what has been regarded as Himalayan *P. vrieseanus* should be referred to *P. Cathcarti* but his lines of parting between species are too arbitrary, and without material from Sumatra, cannot well be followed.

Lemnaceae.

Lemna sp. A minute aquatic herb; in the Plains (in *Zone 1*) by the Kundil river near Sadiya (32672).

Wolffia Michellii, Schleid. : *W. arrhiza*, Wimm. Hook. f., Fl. Brit. Ind. vi, p. 557. The smallest of the higher plants, a minute aquatic herb, in distribution through the tropical and temperate parts of the World, in the Plains, (Zone 1) by the Kundil river near Sadiya (32673).

Alismaceae.

Lophotocarpus guyanensis, Smith. : *Sagittaria guyanensis*, H. B. & K. : Hook. f., Fl. Brit. Ind. vi, p. 561. An aquatic herb, in distribution Indo-malayan and to Australia, found (in Zone 1) in the Plains at Sadiya on the edges of rice-fields (32647), in flower and in fruit in August.

Cyperaceae.

Kyllingia brevifolia, Rottb. C. B. Clarke in Hook. f. Fl. Brit. Ind. vi, p. 588. A small perennial sedge, in distribution round the world, in the Hills (Zone 3) in Balek, and (in Zone 4) plentifully on the clearings of Babuk from 1,500 ft. to 3,100 ft. or 457 to 945 m. (37646) and making a sward by the Dihang opposite the camp at Yambung.

Pycereus globosus, Reichb. *P. capillaris*, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 591. A perennial sedge of moderate size, in distribution through the Tropics and Temperate regions of the Old World, in the Hills (Zone 4) in the sand of the Dihang bank near upper flood limit opposite Yambung at 940 ft. or 274 m. (36009), in the variety *lurida*. C. B. Clarke (in Philip. Journ. Sci. ii. C. Botany, 1907, p. 80) called it a sylvan species, but in the Abor Hills it grows in neglected clearings.

Cyperus niveus, Retz. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 601. A small perennial sedge, a turf-plant by habitat, with a distribution not easily classified, extending all along the Himalaya, through northern Burma and into the mountainous provinces of south-western China; it appears here and there south of this up to a distance of 300 miles from the Himalaya; in the Plains found (in Zone 1) only upon the Kemi chapri (38120) and there rather rare; it was sought for in vain on the Pilung chapri. It flowered in March.

Cyperus diffusus, Vahl. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 603. A perennial sedge, in distribution pantropic, and beyond in the warm temperate regions; in the Hills, (in Zone 4) on the east bank of the Dihang opposite the camp at Yambung, and on old clearings at low levels between Yambung and Sissin, and between Rotung and Ponging (37502) and also upon a clearing at Rotung at 1,600 ft. of 488 m., its highest.

Mariscus sieberianus, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 622. A fairly large sedge, in distribution pantropic and into the warm temperate regions; in the Plains, (*Zone 1*) only once found, and that on the Kemi chapri (38116), not yet at flowering in February.

Fimbristylis diphylla, Vahl. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 636. A sedge of moderate size, in distribution pantropic and in the warm temperate regions of the World; in the Hills, (*Zone 4*) at 700 ft. or 213 m. in some old clearings on the north bank of the Dihang opposite Rotung, which carried a growth of small trees (37510).

Fimbristylis junciformis, Kunth. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi p. 647. A rather small sedge in distribution Indo-malaysian, in the Plains, (*Zones 1 and 2*) in the sward of the Kemi chapri (38114), and on the Pilung chapri, flowering in March and (in *Zone 4*) in a pig-wallow at 5,500 ft. or 1,646 m. in forest above Rotung.

Scirpus setaceus, Linn. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 654. A small sedge, in distribution through the warmer parts of the Old World; in the Plains, (*Zone 1*) in mud of the Brahmaputra left by the falling river at Pobamukh (38235), in March.

Scirpus ternatensis, Reinw. *Scirpus chinensis*, Munro. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi p. 662. A large sedge, in distribution Himalayo-chinese; in the Hills, (*Zone 3*) at Renging (36685) in the form *estosus*.

Scleria elata, Thw. C. B. Clarke in Hook. f., Brit. Ind. vi, p. 690. A perennial sedge of moderate size, in distribution Indo-malayan and in eastern China; in the Hills, climbing through bushes, leaning on them (*Zone 3*) at Janakmukh (37250) and upon the south face of Bapu at about 4000 ft. or 1219 m., on the edge of a clearing near Renging camp, (*Zone 4*) at Ripshing Sieng 5,700 ft. or m. upon the bank of the Dihang opposite Rotung in the edge of the forest at 800 ft. or 243 m. (37504) at Rotung village and upon the hill crest immediately over it at 2400 ft. or 731 m., on "Signal hill" over Yambung camp, and on the edge of the forest at the side of the clearings of Pangi village at 3,800 ft. or 1,159 m.

Carex Thomsoni, Boott. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 703. A perennial sedge of moderate size, and very interesting, growing in river-beds where it is half the year submerged under a moderately rapid current, and half the year exposed, in distribution Himalayo-chinese, its eastward extension ending with the Ichang gorge; in the Plains, (*Zone 1*) in the bed of the Brahmaputra at Kobo (37088) on the wide shingle flat, and at Pobamukh (38232) on a

shingle flat there, in the Hills, (in *Zone 4*) in the Sireng river at its mouth, but nowhere in the Dihang whose current seems to be too fierce. It flowers in March. The inflorescence is short and very tough. After flowering the Rains come and the river rises over the plants. Whether the seeds ripen before this happens or after, was not ascertainable; but at the end of the Rains when the rivers fall from off the plants, then the seeds are held still on the infructescence and there they germinate. During the Rains the current has bowed the whole to the ground, and in contact with it the seeds put out their roots, not only finding the river bed, but invariably a small collection of debris caught and held as the lagging waters finally drain away. In this way the generations of plants are perpetually "walking down stream," each new one 20-25 cm. below the last. The upstream distribution is probably done by wading birds catching their feet. The new seedlings must secure their position before the next Rains or they are certainly lost.

Carex rara, Boott. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 713. A perennial sedge of moderate size, in distribution Indo-malaysian extending to Australia and Japan, but rather irregularly; in the Hills, (in *Zone 4*) covering the centre of the swamp Ripshing Sieng at 5,500 ft. or 1,676 m. (36980), and in the first of March just in flower.

Carex cruciata, Wahl. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 715. A perennial sedge of rather large size, in distribution Assamo-malaysian but also in Madagascar. It was found in partial shade or in openings in the forest (in *Zone 3*) from the river bank just below flood limit at Janakmukh (37149) to above Renging camp at 5,100 ft. or 1,554 m. and back (in *Zone 4*) on an exposed hill face over Rotung. On the top of "Signal hill" over Yambung and on clearings over the Libang stream. Its flowers are produced at the end of the Rain and apparently in the Abor Hills sparingly.

Carex filicina, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 717. A perennial sedge of rather large size, in distribution Indo-malaysian; in the Hills (in *Zone 3*) on a dry exposed ridge at 4,700 ft. or 1,433 m. upon the south slope of Bapu (36967).

Carex baccans, Nees. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 722. A fairly big perennial sedge, in distribution Indo-malaysian, and in east China, in the Hills, in (*Zone 4*) found at Rotung on the edge of the gorge of the Dihang at 1,300 ft. or 396 m. (37381), with its bright red fruits in December.

Carex composita, Boott. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 724. A rather large perennial sedge, in distribution Assamese; in the Hills scattered (in *Zone 4*) in tufts over the surface of the swamp Ripshing Sieng, at 5500 ft. or 1,676 m. (36974).

Carex insignis, Boott. C. B. Clarke in Hook. f., Fl. Brit. Ind. vi, p. 725. A rather large perennial sedge, in distribution Assamese, in the Hills (in Zone 4) plentiful in shade on a bank facing south over the mouth of the Yamne at 1,600 ft. or 489 m. (36155).

Gramina.

Paspalum conjugatum, Berg. Hook f., Fl. Brit. Ind. vii, p. 11. An annual grass of moderate size, and in distribution pantropic, and in the warm temperate regions ; in the Hills, interesting as the grass which comes nearest to making a sward, for on well-trodden pathsides it is able to hold the ground in patches. Such patches are naturally close to villages and the plant was found (in Zones 3 and 4) at Balek, Ponging, Rotung, Babuk (37672) and Pangi. It was seen also by the side of the Shile stream between Balek and Janakmukh, and at Yambung, in both places on routes from populous villages to passages of the river Dihang. It was found further upon old clearings at Rotung, and north of the Dihang opposite Rotung towards Ponging (37518) among small tufts of *Mallotus* and tufts of *Saccharum*.

Isachne albens, Trin. Hook. f., Fl. Brit. Ind. vii, p. 22. A rather low creeping perennial grass, in distribution Himalayo-malaysian : in the Hills, (in Zone 3) upon a small opening in the forest on the north face of Bapu at 5,700 ft. or 1,737 m. (36989) and (in Zone 4) in the edge of the forest by the clearings of Pangi village at 3,800 ft. or 1,158 m. (37788).

Panicum Crus-Galli, Linn. Hook. f., Fl. Brit. Ind. vii, p. 30. An annual grass of moderate size, in distribution pantropic, and in the warm temperate regions ; in the Plains, (in Zone 1) common at Sadiya in moist places (35781), in the variety *stagninum*.

Panicum indicum, Linn. Hook f., Fl. Brit. Ind. vii, p. 41. A slender grass, in distribution Indo-malaysian, in the Hills, common (in Zone 4) on the clearings of Kalek between 2,000 and 3,800 ft. or 610 and 1,158 m. (37570), in the variety *elatum*.

Panicum incisum, Munro. Hook. f., Fl. Brit. Ind. vii, p. 51. A rather small perennial grass, in distribution Assamese ; in the Plains, (in Zone 1) not uncommon upon the banks of the Brahmaputra at Kobo and between Kobo and Pobamukh (35915, 37055).

Panicum sarmentosum, Roxb. Hook. f., Fl. Brit. Ind. vii, p. 54. A perennia scrambling grass of considerable size, in distribution Indo-malay-

sian, in the Plains, (in *Zone 1*) common at one spot on the bank of the Brahmaputra between Kobo and Pobamukh.

Panicum plicatum, Lamk. Hook. f., Fl. Brit. Ind. vii, p. 55. A perennial grass capable of attaining a very considerable size, in distribution Indo-malaysian; in the Plains, found (in *Zone 1*) on the pathside at Kobo (37085), in the Hills, (in *Zone 3*) on the south face of Bapu at 4,700 ft. or 1,433 m. on a dry ridge common (36968), and (in *Zone 4*) among the clearings of Rotung village (37630) in the Yambung gorge and over Panggi at 3,800 ft. or 1,158 m. on the edge of clearings.

Panicum pilipes, Nees and Arn. Hook. f., Fl. Brit. Ind. vii, p. 57. A perennial grass of moderate size, in distribution Mascarene and as regards Asia Indo-malaysian, to Australia and the Pacific; in the Hills, (in *Zone 3*) in open places on the river bank above flood level near Janakmukh (37200) and by the Sipi stream.

Panicum uncinatum, Raddi. Hook. f., Fl. Brit. Ind. vii, p. 58. A rather small perennial grass, in distribution Indo-malaysian and in America: in the Plains, (in *Zone 1*) at Kobo upon the pathside (37009).

Ichnanthus pallens, Munro. Hook. f., Fl. Brit. Ind. vii, p. 60. A rather small grass, in distribution, pantropic: in the Hills (in *Zone 3*) on the south face on Bapu on a pathside just above the village of Balek (36956) and in shade again a little higher at 2,300 ft. or 701 m. (36957) and higher still upon a dry ridge at 4,700 ft. or 1,433 m. (36969).

Thysanolaena maxima, O. Ktze, *T. agrostis*, Nees. Hook. f., Fl. Brit. Ind. vii, p. 61. A tall reed, in distribution Indo-malaysian, and in eastern China: in the Hills in three rather similar spots, (in *Zone 3*) upon the undercliff at Janakmukh just above flood level (37210), and (in *Zone 4*) upon the rock which rises out of the river called Kekar Monying (37619) and thirdly at Puak near the river.

Oplismenus compositus, Beauv. Hook. f., Fl. Brit. Ind. vii, p. 66. A grass of moderate size, in distribution almost pantropic; no small grass is more a forest plant in my region than this; in the Plains (*Zone 1*) got by Griffith at Sadiya, and recorded by him under the name *Orthopogon* (*Notulae*, iii, p. 43), not uncommon at Kobo in immature forest (35911), in the Hills, (in *Zone 3*) at Janakmukh, and over Balek at 2,000 ft. or 610 m. rare, then on soils derived from the Abor Volcanic rocks frequent from Renging camp (36715) and over it (into *Zone 4*) to Rotung (37611, 37612), and over it to 3,000 ft. or 914 m. and to the hill over the Libang stream at 2,600 ft. or 792 m.

Arundinella intricata, Hughes in Kew Bull., 1920 p. 112. A tufted grass of moderate size, and peculiar habitat, growing on rocks which are submerged by the fierce current of the Rains, adhering in a remarkable way with a very tightly interwoven mat of roots, in distribution Assamese; in the Hills, (*Zone 4*) in the upper part of the bed of the Dihang below flood level under Ponging and under Rotung at 700 ft. or 213 m. (37371) and up to Yambung at least. It was in flower in December.

Arundinella Walllichii, Nees. Hook. f., Fl. Brit. Ind. vii, p. 75. A small reed partial to dry banks, in distribution Himalayo-burmese with an extension beyond the Bengal plains in Chota Nagpur; in the Hills (in *Zone 4*) at extreme flood level upon the bank of the Dihang opposite Yambung at 900 ft. or 174 m. (36010).

Setaria glauca, Beauv. Hook. f., Fl. Brit. Ind. vii, p. 78. A rather small annual grass, in distribution pantropic and in the warm temperate regions; in the Hills, (in *Zone 4*) upon the bank of the Dihang under Ponging, and at the mouth of the Side river in sand (36036) and upon the clearings of Pangi village.

Oryza sativa, Linn. Hook. f., Fl. Brit. Ind. vii, p. 92. The Rice plant in cultivation all round the world, but of eastern origin: in the Plains, (*Zone 1*) at Sadiya an early race is sown in April and reaped towards the end of August (Ronga ahu, 32549, 32628) or sown later and reaped later, the season being accommodating enough, and later races are also grown, one of which is Boga ahu (32550): in the Hills (*Zones 3 and 4*) and on the Balek clearings under the hills (*Zone 2*), the Abors grow rice as their main crop, but the season of this was nearly over at the time of the Expedition: and their spring crop was not sown at any place visited. One race only was actually found still growing (37491 from Rammidambang, 37561 from Kalek); its grain is 6 by 3.5 mm.

It appears that the Abors grow other races of which two would seem to be the Pe-shi-am and Dang-gam-am of Lorraine's Dictionary, Am being rice, while Ali is paddy.

The clearings bearing rice were observed to ascend to 3,800 ft. or 1,158 m. and at that height the crop was garnered in the last days of the year; but at lower elevations it is garnered much earlier.

Coix Lachryma-Jobi, Linn. Hook. f., Fl. Brit. Ind. vii, p. 100. Job's Tears, a grass of moderate size, wild and cultivated through the warmer parts of Asia, and cultivated elsewhere in the Tropics; in the Hills (*Zones 3 and 4*) there are three varieties, one, the ordinary wild plant with a very hard coat to the fruit was found by Renging camp (36732), the second and commonest,

being extensively cultivated has a reddish soft coat (No. 37539 from Rotung, no. 37217 from Aieng, and No. 37559 from Kalek) : the third is like the second in its thin coat and general growth, but the coat is pale green to maturity when it goes greyish white (No. 37560 from Kalek). Both the second and the third may be classed under the varietal name *Ma-yuen*, Stapf. The Abors grow Coix mixed with rice in the clearings at lower elevations, or mixed with rice and *Eleusine* in those at higher elevations. It ripens in December and January.

Zea Mays, Linn. Hook. f., Fl. Brit. Ind. vii, p. 102. The Maize, a tall grass of American origin which is cultivated round the World. In the early days of Sadiya as a British outpost, much good maize seed was distributed along the border. In the Plains (*Zone 1*) it is cultivated about Sadiya, in the Hills (*Zones 3 and 4*) the Abors grow it at all the villages calling it Sa-pa, Se-pa or Te-pang.

Imperata arundinacea, Cyrill. Hook. f., Fl. Brit. Ind. vii, p. 106. A perennial grass of moderate size, in distribution pantropic, a sun-demanding grass : in the Plains, (*Zone 1*) in open land at Sadiya, Kobo by the river Brahmaputra and (in *Zone 2*) on the Kemi chapri, in the Hills (in *Zone 4*) on the margin of the Dihang where the clearings of Ponging descend to it, and in similar places upon both banks of the river near Yambung, affording a certain amount of grazing to the villagers' mithan. It comes into flower in March.

Miscanthus nepalensis, Hack. Hook. f., Fl. Brit. Ind. vii, p. 107. A tall perennial grass, in distribution Himalayo-chinese : in the Hills (*Zone 3*), upon the gravel of the undercliff at Janakmukh in plenty (37206), and upon a steep shingly bank facing south in the Serpo valley near Renging camp.

Saccharum officinarum, Linn. Hook. f., Fl. Brit. Ind. vii, p. 118. The Sugar-cane, a big grass of Asiatic origin, now cultivated all round the World : in the Plains, (*Zone 1*) grown on a small extent at Sadiya, in the Hills, (*Zones 3 and 4*) in tiny patches within the Abor villages of Balek, Ponging and Pangi which for the most part must be fenced from the village pigs. The Abors call it Ta-bat. Doubtless they grow it rather more extensively than was observed probably in all their villages but the three named were the only ones except Aieng, in a normal state at the time of the Expedition.

Saccharum arundinaceum, Retz. Hook. f., Fl. Brit. Ind. vii, p. 119. A very tall perennial grass, in distribution Indo-malaysian, and in eastern China, in the Plains (*Zone 1*) common at Sadiya about the limits of the grazed land around the village, and in secondary jungle beyond (35776) ; on the

edge of the Kemi chapri near Kobo, and (in *Zone 2*) close to the river at Pasighat, in both the places associating with *Bombax* and *Zizyphus*, in the Hills, (in *Zones 3 and 4*) it may associate with *Saurauja* upon old clearings as seen at Ponging, Rotung and Yambung, but about the first two it is relatively rare. It appears however to show that the climate as one proceeds deeper into the Hills suits it better, and within the area where it grows about Yambung it might almost be called common. From this place looking northwards there seems to be plenty of it upon clearings. It occurs at stream junctions as well as on clearings and is to be found at the mouth of the Sireng river, that of the Yambung and at the junction of the two streams which together make the Yambung. The Abors call it Le-eg.

Ischaemum rugosum, Salisb. Hook. f., Fl. Brit. Ind. vii, p. 127. An annual grass of medium size, in distribution Indo-malaysian, in the Plains, got (in *Zone 1*) by Griffith at Sadiya (*Notulae*, iii, p. 93).

Pogonatherum saccharoides, Beauv. Hook. f., Fl. Brit. Ind. vii, p. 141. A small perennial grass, of excessively drained places, in distribution Indo-malaysian, in the Hills, on rocks about the upper flood limit along the course of the Dihang (*Zone 3*) at Janakmukh, (*Zone 4*) under Ponging and Rotung, at Puak and at Yambung.

Arthraxon rudis, Hochst. Hook. f., Brit. Ind. vii, p. 144. *Andropogon castratus*, Griffith, *Notulae*, iii, p. 89. A grass of medium size, in distribution curious, Ceylon and Upper Assam, in the Plains (*Zone 1*), got by Griffith at Sadiya in January, 1836 "in campis graminosis," which should indicate the grazing land round the village.

Andropogon assimilis, Steud. Hook. f., Fl. Brit. Ind. vii, p. 179. A grass of moderate size, in distribution Indo-malaysian, found on the plains at the top of Assam, *e.g.*, Sadiya.

Andropogon zizanioides, Merrill. *A. squarrosus*, Linn. Hook. f., Fl. Brit. Ind. vii, p. 186. A tall grass, in Africa, and as regards Asia in distribution Indo-malaysian; in the Plains (*Zone 1*), recorded by Griffith as found at Sadiya (*Notulae*, iii, p. 85), to which record he adds the statement that possibly two species are confused under the one name.

Andropogon aciculatus, Retz. Hook. f., Fl. Brit. Ind. vii, p. 188. A low perennial grass, essentially one of places where a sward is possible, in distribution Indo-malaysian and through to the Pacific, in the Plains (*Zone 1*), common in the grazing ground round Sadiya, in the Hills (*Zone 4*), close to the village of Rotung, and upon the side of the path from Yambung to Pangi near the east bank of the Dihang.

Themeda gigantea, Hack. *Anthistiria gigantea*, Cav. Hook. f., Fl. Brit. Ind. vii, p. 216. A very tall grass, in distribution Indo-malaysian, in Australia, China and to the Pacific, in the Hills, not found towards the plains, but found (in *Zone 4*) within the rainscreen of Bapu by the Ibung stream near Ponging, near Kalek at 3,300 ft. or 1,006 m., and in greater quantity about Yambung between 900 ft. and 1,500 ft. or 274 and 457 m. along with *Phalaris*.

Garnofia stricta, Brongn. Hook. f., Fl. Brit. Ind. vii, p. 243. A small grass in distribution Indo-Burmese, and also in the Hawaiian islands; in the Hills (*Zone 4*) growing in dense tufts upon rocks in the gorge of the Yambung from 1,000 to 1,200 ft. or 305 to 366 m. (37757).

Polypogon monspeliensis, Desf. Hook. f., Fl. Brit. Ind. vii, p. 245. An annual tufted grass of moderate size, in distribution pantropic and also in the warm temperate regions; in the Plains (*Zone 1*) springing up in the camp at Kobo (38109) and flowering in the end of February.

Sporobolu sdiander, Beauv. Hook. f., Fl. Brit. Ind. vii, p. 247. A grass of moderate size in distribution Indo-malaysian and to Australia, in the Plains (*Zone 1*), obtained by Griffith at Sadiya in April 1836 (*Notulae*, iii, p. 44).

Sporobolus indicus, R. Brown. Hook. f., Fl. Brit. Ind. vii, p. 247. A grass of fair size, in distribution pantropic; in the Hills (*Zone 4*) upon old clearings, as at Rotung (3754) Pangi and Babuk; and upon pathsides at Ponging and Pangì. At the latter place it was particularly prevalent in the lower parts of the big clearing north of the village.

Cynodon dactylon, Pers. Hook. f., Fl. Brit. Ind. vii, p. 288. A small perennial grass, in distribution pantropic, and into the temperate regions, in the Plains (*Zone 1*), on the sandy bank of the Brahmaputra below extreme flood level, and in the Hills (*Zone 4*) upon the east bank of the Dihang near Yambung camp.

Eleusine indica, Gaertn. Hook. f., Fl. Brit. Ind. vii, p. 293. An annual grass of moderate size, in distribution throughout the Tropics of the Old World; in the Plains (*Zone 1*) at Kobo only.

Eleusine coracana, Gaertn. Hook. f., Fl. Brit. Ind. vii, p. 294. An annual cultivated grass, obviously derived from *E. indica*, but quite reasonably regarded as a species, much grown along the Himalaya and elsewhere; in the Hills, (*Zones 3 and 4*) after rice the chief grain crop of the Abors, who make a light beer from it. It is to be found in every village, but one race only was observed. It was collected at Aieng under the number 37218, at Rammidambang under 37497, and at Rotung under 37540.

Phragmites Karka Trin. Hook. f., Fl. Brit. Ind. vii, p. 304. A big reed, in Africa, as regards Asia Indo-malaysian, and through to Japan and Australia, the more moist the climate the more abundant: in the Plains (*Zones 1 and 2*) common on the banks of all the rivers where it does a great work in bringing about the closing of backwaters. From the banks it may get detached and live long enough to outlast the flood and lead a temporary existence in the bared river bed: thus it comes to associate with *Homonoia*, but it never flourishes in such positions and probably does not outlast the succeeding Rains. I believe that it is the "Arundo No. 5" of Griffith's *Journal*, l. p. 48, which he got at Sadiya. Under the Hills between Pasighat and the hill-foot below Balek upon the Pleistocene gravels it takes possession of clearings, and in the Hills (*Zone 4*), it takes possession also of the clearings on "Signal Hill" over the Yambung camp.

Triraphis madagascariensis, Hook. f. *Neyraudia madagascariensis*, Hook. f., Fl. Brit. Ind. vii, p. 305. A tall reed, in distribution in Africa, and as regards Asia Himalayo-malaysian, and through China: in the Hills (*Zone 3*), on a shingly clearing below Renging camp in the Serpo valley and (*Zone 4*) very common along the banks of the Dihang just below extreme flood level in the Rotung gorge at 700 ft. or 213 m. (37511).

Eragrostis amabilis, Wight and Arn. Hook. f., Fl. Brit. Ind. vii, p. 317. A small annual grass in distribution Indo-Burmese or possibly Indo-malaysian: in the Hills (*Zone 4*), upon the edge of a well trodden path just below the stockade of Pangi village in association with *Paspalum conjugatum* forming a sward.

Centotheca lappacea, Desv. Hook. f., Fl. Brit. Ind. vii, p. 332. A perennial grass of moderate size, in distribution in Africa and as regards Asia Indo-malaysian, extending to eastern China and the Pacific; in the Hills (*Zone 4*) found only upon a few old clearings at the back of the rain-screen of Bapu, e.g., at Rotung, and across the Dihang from Rotung towards Ponging (37517), and towards Sissin from Yambung (36019) between 800 and 1,400 ft. or 244 and 427 m.

Triticum vulgare, Vill. Hook. f., Fl. Brit. Ind. vii, p. 367. The Wheat plant, cultivated in all suitable climates of the World of which the Abor Hills do not furnish one, only in the Hills (*Zones 1, 2, 3 and 4*), at the camps of the Expedition springing up freely from accidentally scattered grain.

Arundinaria griffithiana, Munro. Hook. f., Fl. Brit. Ind. vii, p. 379. A large bamboo, in distribution, Assamese: in the Hills, (in *Zone 3*) sterile and therefore a little doubtful, on the summit of Bapu at 6,266 ft. or 1,910

m. (36550) attaining a height of 10 m. A bamboo similar to this by description was observed by Major F. H. Sweet upon the upper part of a mountain north of Damroh.

Arundinaria Mannii, Gamble. Hook. f., Fl. Brit. Ind. vii, p. 383. A wide sprawling bamboo, unfortunately found sterile only, but a close match of the Khasia Hills specimens on which the species is founded. It is in distribution Assamese. As found in the Abor Hills the thin stems are solid, and they hang from the very top of the forest in long streamers, in the Hills (*Zones 3 and 4*), it affects the steepest slopes. Near Ponging it was seen at 1,200 ft. or 366 m., but it is rare at such low levels; on the south face of Bapu it was found at 4,000 to 4,500 ft. or 1,219 to 1,372 m. On the "Razor edge ridge" between the Igar and the Lalik streams it is very common. over Rotung it was at 3800 ft. or 1,158 m. and over Renging camp it was plentiful from 3,000 ft. to 5,100 ft. or 1,554 (36301) in places where the drainage is extreme. It was seen also near Kalek.

Griffith got what he calls a subscandent bamboo (*Journal*, 1, p. 42) in the Mishni Hills and it is reasonable to ask if it were not this species.

Bambusa pallida, Munro. Hook. f., Fl. Brit. Ind. vii, p. 389. A large bamboo, in distribution Assamo-burmese, in the Hills (*Zone 3*), by the Dihang north of Janakmukh (37202).

Dendrocalamus Hamiltonii, Nees and Arn. Hook. f., Fl. Brit. Ind. vii, p. 405. A very large bamboo, in distribution Himalayo-burmese, if really wild in Garhwahl, or if not Assamo-burmese; in the Hills (*Zones 3 and 4*), upon the steepest slopes and slopes at their steepest, and so by the conformation of the hills making belts upon them. Its culms are rather weak, and fall across each other at all manner of angles making it difficult to pass straight through a belt, and at them the innumerable Abor hunting paths always get lost. South of Rotung these belts are particularly well developed. The plant occurs as low down as the mouth of the Yamne and at least as high as 4,600 ft. or 1,402 m. It was not flowering.

Dendrocalamus Hookeri, Munro. Hook. f., Fl. Brit. Ind. vii, p. 405. A big bamboo, in distribution Assamo-burmese; in the Plains (*Zone 2*) at Pasighat, in the Hills, (*Zones 3 and 4*) planted and cultivated in a desultory way by the Abors. Balek takes its name from the extensive grove of this bamboo upon the east of the village, which grove the villagers say was planted seven generations back (36886). It occurs again in noteworthy quantity on either side of the Dihang near the mouth of the Yambung stream. Di-bang is an Abor word for Bamboo and E-pawh is another.

Pseudostachyum polymorphum, Munro. Hook. f., Fl. Brit. Ind. vii, p. 109. A large bamboo, in distribution Assamo-burmese : in the Plains (*Zone 1*) close to the bank of the Brahmaputra between Kobo and Pobamukh with new young shoots and at the same time flowering from old culms 3-4 m. high (35923).

Cephalostachyum fuchsianum, Gamble. Hook. f., Fl. Brit. Ind. vii, p. 413. A small half-sprawling bamboo in distribution Assamo-burmese ; in the Hills (*Zone 4*), upon the edge of the forest limiting the clearings of Pangi village at 3800 ft. or m. very abundant and with new shoots 2 m. high in early January (37778).

Dinochloa McClellandi, Kurz. Hook. f., Fl. Brit. Ind. vii, p. 415. A long sprawling bamboo, in distribution Assamo-burmese ; in the Hills (*Zone 3*), upon the south face of Bapu about 4600 ft. or 1402 m. at a place where the slope is of the steepest, growing in small sheets (36535). The Abors called it Ta-bu.

Undetermined grass. The north and west edges of the swamp Ripshing Sieng (*Zone 4*) were found to be bordered by a tender grass, suggesting a *Poa*, the stems running and rooting in the oozy ground, the leaves 20 cm. and more long, by 2 mm. in width. Though appearing succulent, no signs of grazing animals were observed. There were no flowers.

ADDENDUM.

(This species was omitted from p. 287.)

Begonia Inflata, C. B. Clarke in Hook. f., Fl. Brit. Ind. ii, p. 636. A tall *Begonia* growing 1 m. high, in distribution Assamese. It was found usually by streams, e.g., (in *Zone 3*) on the banks of the heerpo, or (in *Zone 4*) on the banks of the Sireng at 750 ft. or 228 m. (37586), the banks of the heide, of the Igar at 2000 ft. or 610 m. (37523) ; but it was not confined to such places and was got between Rotung village and the Sireng river mouth, over Rotung at 3600, 4700, 4800 and 5000 ft. or 1097, 1433, 1633 and 1524 m. the last in a pig-wallow, between Rotung and Kalek at 2000 and 3000 ft. or 610 m. and 914 m., north of Kalek at 3000 ft. or 914 m. (37564), above Babuk at 3800 ft. or 1158 m. very commonly (37656), and on the side of "Signal Hill" towards the Yambung stream. It was found in fruit, but not in flower.

SUMMARY.

1. The report contains an enumeration (pp. 203-412) of all the plants collected upon the Abor Expedition of 1911-1912, except the Algæ for which see a separate paper in these Records by Miss Nellie Carter, D.Sc.

2. The Botanical Survey party was with the Expedition from November 29th, 1911 to March 11th, 1912, and made an attempt to collect, especially, every Spermatophyte observable between the base camp at Kobo, and headquarters at Yambung. A little collecting was done, also, before the Expedition about Sadiya (p. 1).

The area collected over extends, as is shown by the map at the commencement, from the middle of the top of the Assam plains, through the outer line of hills and for a short distance into the second line.

3. The area is considered as that of the most uniform humidity in India. It is described on pp. 4-7. This uniform relative humidity is indicated in the tables on pp. 7, 66 and 155. The rainfall is seasonal (pp. 7 and 156); and there is a slight periodicity in leaf-fall (pp. 39-41). Its soils are indicated on p. 10.

4. A temperature curve is given on p. 9 showing Abor-land to have such changes through the months as are typical of the northern temperate zone, and to differ from most of India where a three-season cycle prevails.

5. Abor-land and Singapore are compared, the relative humidity of the two differing little, and the average temperature differing little, but the distribution of temperature through the year differing greatly.

6. Abor-land (the area explored) is divided into 4 zones on p. 6; and zones 2 and 3 of them exceed the others in humidity.

7. As floras existing under extreme conditions reveal past hytogeographic changes more clearly than floras of normal climates, the Abor-land flora possesses considerable scientific importance.

8. It is described from the ecological point of view on pp. 20-43. There is the magnificent climax forest of the loams of the plains (p. 20), modified under the hills by a gravel subsoil into a climax with *Terminalia myriocarpa* ruling (p. 28) and modified in the hills by the slope of the ground, and again by exposure and altitude, and producing where the ground faces north, the peculiar Shingkeng forest (p. 29) and on the steepest slopes the Bamboo belts (p. 30). In the hills where the river has a permanent bank, the forest exhibits a modification, due to the wall its limit forms, which is likewise a climax (p. 35): but in the plains the want of a permanence in the banks, causes the forest to exist in the condition of a pre-climax, where climbers greatly prevail (p. 20). Vegetation in the condition of seres exists on the sandbanks and the clearings, which are in process of re-afforestation (pp. 33 and 39).

A peculiar climax vegetation is that which occupies the river-beds and has permanence there (p. 36).

9. The tallest tree measured was found to be 174 ft. high (p. 257).

10. The tallest trees of the level climax forest are commonly small-leaved and wind-distributed. Under them are larger-leaved trees, which are animal-distributed. A sufficiently thick canopy of foliage from these causes a "light-diffusion space" (p. 20), under which vegetation depending on light recommences, clothing the soil more or less. The leaves of this diffused ground-shade vegetation are typically small and the distribution is by animals (p. 23). But where the forest is broken and the vertical light, but not the wind, is let in, particularly large-leaved plants find a place (p. 24).

11. Sloping ground by causing the larger trees to stand unevenly, and probably acting through uneven drainage also, is apt to let so much more light enter under the canopy, that the ground vegetation is able to approach the lower limits of the canopy and to render the light-diffusion space less distinct or insignificant. Thus the hill-forests differ from the plains-forests.

12. In phytogeography, a clear understanding of the conditions whereunder each species exists whether an unit in a climax or a member of a sere, is likely to be demanded in order that the species natural to one area may be compared with the species natural to another, and the species permitted in an area with the species permitted in another (p. 11); but the condition of the science is at present such that this is not possible, and the only satisfactory basis for comparison is to take all the naturally occurring species of an area together.

13. Discarding none of the Spermatophyta of Abor-land which occur truly wild, their dispersal through the world is given in the tables on pp. 74-141.

14. In a diagram on p. 143 the gradual disappearance of the species westwards, eastwards, south-eastwards, and south-westwards is given statistically. The species obtain a distribution-value in the table on pp. 74-141. The way in which the value have been arrived at is detailed on p. 150.

15. It is found that the species of Abor-land become gradually fewer in a westward direction (towards dry hills) along the Himalaya (p. 144); that the change eastwards is much more abrupt (p. 146) and the suggestion is made (p. 145) that this is due to the wearing out of the south-west monsoon air-current. South-eastwards and south-westwards, there are marked irregularities; for instance, the Malay Peninsula is a wet trough (p. 147) beyond which in Java and towards Australia, plants occurring in Abor-land, though excluded from the Singapore end of the Peninsula, reappear; and again there is a broken distribution south-westwards not merely on the mud of the Bengal plain but across the north of the Deccan, some Abor plants reappearing in a disconnected manner in Malabar. Attention is called to these and other breaks in the distribution (pp. 152-159).

16. Taking the *genera* of the Abor-land Spermato-phyta and working out their dispersal (table 13, p. 166), it is easily seen that many confined to the eastern part of the Old World, are strongly developed in Malaysia and a few are strongly developed in China. There is a presumption that none of these confined to the eastern part of the Old World, had their genesis elsewhere than in Asia or Malaysia or near thereto. The genera strongly developed in Malaysia comprise many epiphytes (p. 172) and are as a whole hydro-megathermic or belonging to tropical rain-forest. The genera strongly developed in China are shrubby and obviously not hydro-megathermic (p. 173).

17. There is a list of Abor-land genera which extend from Asia into America on p. 187.

18. There is another list of Abor-land genera which extend in the other direction, *i.e.*, to Africa (p. 188). Only a few of these fail to extend to Malaysia (p. 191), also ; and some of these genera are hydro-megathermic (p. 190).

19. For their dispersal to have taken place, it is necessary to seek for past land-connections, and not only past land-connections, but continuity of suitable climates. The map on p. 165 suggests the routes by which migration took place.

20. The floras on the map are represented by numbers. The flora of Abor-land is no. 1. Near it is no. 3 representing a sub-tropical rain-forest flora, which exists in Assam and North Burma, etc., and of which flora no. 1 is but a part. No. 2 is the tropical rain-forest flora (hydro-megathermic) of South India and Ceylon. The old suggestion is adopted that in Miocene times a widely spread hydro-megathermic flora existed in Asia and the lines on the map connecting Malaya with no. 3 and both with no. 2, and no. 2 with Africa are the lines along which interchange of species occurred. Flora no. 4 later pressed into the Indian area from the west in a drier period, and flora no. 6 pressed in from the north in a colder period. Obviously the pressing in of flora no. 6 is to be connected with the Glacial Period.

21. The northern element, flora no. 6, is listed on p. 181 ; endemic species have evolved in it.

22. Endemic genera (mostly of quite small size) have evolved in flora no. 2 and are enumerated on p. 176. Their existence may be considered as proof that flora no. 2 was in southern India and Ceylon long before the Glacial Period let in flora no. 6, which has not evolved genera but only species.

23. It is quite reasonable to think that India has evolved other rain-forest genera which are not now endemic but have escaped east or west (p. 191).

24. The immediately pre-glacial climate of north-western India was possibly very like the climate that those parts have now (p. 179), and no rain-forest flora would exist. It is extremely probable therefore that a flora as flora no. 4 had found entry into India at the latest in the Pliocene. The Glacial Period would sorely beset it (p. 180).

25. If glaciers in the Glacial Period descended the Himalaya 4000 ft. below their present level, and we assume that plants were driven downwards 4000 ft. it is easy to see how the northern plants that are not endemic species could get into the Deccan. The history, however, of the endemic species is not quite so easily understood. No explanation is attempted, but the suggestion is made, that the leaping of barriers should be studied further by an investigation of Barren Island (p. 196).

26. The cold of the Glacial Period must have been somewhat detrimental to flora no. 2 ; but obviously it held on although unable to move southwards. Arguing from this, the Malayan flora may be considered as having remained stationary likewise through the Glacial Period ; however northern genera have reached Malaysia (pp. 181-185) by unexplained routes, showing the influence of the cold to have extended far South.

27. The Glacial period must have exerted much influence upon the pre-glacial flora of Abor-land, and may well have driven it ten degrees southwards (p. 195) ; but the conformation of the mountains round the Pacific into north-and-south chains made escape and return relatively easy.

28. The Himalaya on the other hand, which is an east-and-west chain, is now remarkably poor in tropical rain-forest endemism (pp. 175—179), as if the Glacial Period had destroyed any pre-existent rain-forest flora from the chain.

29. The generic endemism of flora no. 3 (p. 175) is in degree like flora no. 2, *i.e.*, there are a number of quite small genera, from which fact it may be argued that flora no. 3 has been isolated from the great Malaysian rain-forest flora for a like period to flora no. 2.

30. The Glacial Period in driving flora no. 3 south would not thereby, of necessity, open a road for flora no. 4 eastwards to China ; and an examination of the distribution of the species, which support the climate of the centre of the Gangetic plains, shows that such of them as reach China, have reached India and China alike from the north and are not species of tropical genera whereas the African species have not been able to push eastwards, though some of them have got away south-eastwards (p. 199).

31. As quite an unsupported suggestion, it is pointed out, that an increase of the strength of the cold West Australian sea-current would extend the range of dry-climate plants in Java (p. 201).

32. Malaysia, if such has happened, need never have been other than a collection of islands ; but if such has not happened it would seem necessary to believe that a large part of it has at one time been consolidated into a continent : for it is necessary to believe that dry-climate plants have at one time been able to pass through Malaysia, and the climate necessary for them, if not produced by cold sea-currents, must have been produced by the decrease of sea in the region.

33. In the Deccan, climatic changes have produced the result that the Abor-land plants which persist furthest along the Himalaya, persist over the

least distance into the Deccan (p. 157), while species whose extension into the Deccan is more broken, *i. e.*, those that are not in Chota Nagpur but in Malabar, pass but a short way along the Himalaya. This is explicable easily by the intrusion of flora no. 4 across the land-continuity whereby Abor-land and Malabar got their common flora. It is interesting that the Abor-land with Malabar plants occupy, on the average, a less area in the world than the Abor-land with Chota Nagpur plants.

34. This intrusion of flora no. 4 makes flora no. 2 a flora under contraction, and therefore a bad illustration in the support of Dr. Willis' Age and Area Hypothesis (p. 197).

35. There is no need to assume any great land changes during the existence of the Spermatophyta ; the biggest change, coming within the discussion being the cutting off of Madagascar from Africa ; the second, the cutting of the Behring-Straits land-bridge, and the third, unions and Sunderings in the Malaysian region.

36. For such genera as exist in Abor-land to have crossed the Behring-Straits land-bridge, there is implied, the existence of a warm and moist period at the bridge, which period must have occurred before the cool and moist period that let the last plants cross, and before the dry period that let the camel cross. It may be assigned to the Miocene along with the warmth which led to the community of the Malaysian South Indian and African rain-forest floras round the north of the present Bay of Bengal and Arabian Sea.

37. Since that period the divergence has been developing with separation at, without doubt, different rates in different places.

38. On page 69, it is shown that the two wetter zones of Abor-land carry proportionately more species of trees than the others.

39. But on pp. 161-164 it is shown that the endemic species of Abor-land, which are, as one might expect, chiefly in these wetter zones, are not trees, but herbs. This is as might be anticipated, for the ground vegetation experiences the greatest moisture. They are plants of the valleys.

40. It is suggested (p. 164) that in the depths of the forest, dispersal through anything but very small distances is almost invariable, and that fertilisation is all but invariably from immediately neighbouring flowers, so that tendencies to diverge are encouraged.

41. The endemic species are drawn into one list on pp. 74-77, and in this list the endemics are followed by the rest of the spermatophyta in Series with wider and wider limits.

42. The Khasia Hills and the Sikkim Himalaya share species in approximately equal numbers with Abor-land (p. 159), but the hills of south-eastern Assam taken collectively have more in common with Abor-land than the eastern Himalaya from Sikkim through Bhutan to the Aka Hills.

43. The lower slopes of the Sikkim Himalaya experience in quite a marked way the dry season of the plains of northern India ; and to this may be attri-

buted the striking difference between Sikkim and Abor-land, that species shared in common, descend lower in Abor-land than in Sikkim (pp. 44 and 65).

44. The expression "Cupuliferous boundary line" is used to indicate a line marked on the map on p. 12 beyond which south-westwards Cupuliferæ do not pass; nor do *Pinus*, *Engelhardtia*, etc.

45. East of this line the mountains are of Pacific type, and west of it of Atlantic type (p. 15). The two sides are further in antithesis, markedly so in that the hot dry conditions so wide in Africa come up towards the line from the west, whereas east of it moderate temperatures approach nearer to the Equator than in any other part of the World. Abor-land is against the Cupuliferous boundary line and rather on the Pacific side of it, therefore it is un-Indian, using "Indian" as typical of Hindustan.

46. There is a diagram on p. 73 showing that woody plants predominate over herbaceous in the eastern Himalaya at such elevations as were reached in Abor-land, but that they lose the predominance at greater elevations in the Sikkim Himalaya.

47. There are tables on pp. 71-72 showing the nature of the plants at various altitudes: and on p. 160 their average range.

48. Lists of Himalayan endemic genera, which are, and of others which are by no means, rain-forest genera, will be found on p. 175.

49. Heavy seasonal rains interrupted by periods of little rain, would seem necessary for the evolution of the River bed flora (p. 36). Are not such seasonal changes (p. 202) likely to have accompanied the deposit of the Siwalik gravels?

EXPLANATION OF THE PLATES.

PLATE I. A. The forest near Kobo, on loam. The forest is in the state of subclimax: large climbers such as *Thunbergia grandiflora*, *Porana volubilis*, and species of *Vitis*, are not kept under by a canopy of larger trees, but thrive at the expense of the immature trees and hamper the growth of the large trees. In the centre of the view is a *Sterculia urens* which by rapid growth and branch-pruning has remained free.

B. The forest near Lokpur from the river bed showing a *Duabanga* tree not far from succumbing to the creepers on it. It has cast off almost all its branches in its inability to maintain them alive.

PLATE II. A. In the forest of *Terminalia myriocarpa*. The forest is at its climax; and while the climbers *Vitis*, *Ipomoea*, etc., make a vigorous growth at the edge of the path, they are not able to grow in this forest into the branches of the canopy. The view was taken at the time of leaf-change in *Terminalia myriocarpa* and the foliage is thin.

B. In a bamboo belt upon the slope of the Igar valley. Almost nothing grows with the *Dendrocalamus*.

PLATE III. A. A part of the foliage-wall at the edge of the Sirki stream made by *Strobilanthes macrostegius* in full bloom.

B. The Expedition's road through secondary jungle near Rotung. Trees of *Aralia foliosa* stand in the foreground.

PLATE IV. A. *Musa* by the Igar stream, *M. pruinosa* at the back and *M. paradisaica* with more arched leaves in the front.

B. In forest of *Vatica Shingkeng*, showing the smooth clean trunks and the undergrowth that resembles so much the leafage overhead. The forest is at its climax behind the small opening across which the view was photographed.

PLATE V. A. In mixed forest of *Altingia excelsa*, *Dalbergia*, etc., upon the slope of the Sorpo valley which faces south. The forest is at its climax except that the cutting of the Expedition's path had increased the vigour of the climbers in the foreground.

B. Forest of the same nature and condition, cut into by a small new Abor clearing. The climber hanging down in the foreground is *Arundinaria Mannii*.

PLATE VI. A. The harvest at 3900 ft. or 1189 m. upon the clearings of Pangi village. Abor women are cutting the rice from a mixture of rice, *Eleusine* and *Coix*.

B. Secondary jungle 5—6 years old, and more, upon the wide clearings of Rotung village showing how the Abors leave at wide intervals isolated trees. The hill on the left is Namkam, rising to 7145 ft. or 2147 m: that on the right is west of Kebang.

PLATE VII. A. The way in which *Saccharum arundinaceum* occurs between Ponging and Jaru by the side of a permanent path at the top of a ridge.

B. The way in which another grass, *Phragmites*, *Karka* occurs in Abor-land. A mule convoy passing through old clearings on the submontane gravels, which have become covered by this grass.

PLATE VIII. A. The edge of the rather small Behrung chapri,—a sandbank on the way to re-afforestation, in the sere or stage at which man's interference by fire is most effective. The Behrung chapri is but occasionally fired and the invading trees are seen, deciduous trees, encroaching upon the grass land. *Bombax malabaricum* and a *Dalbergia* are the chief of them.

B. The edge of the Kemi chapri which is fired every year. *Streculia urens* is at the spot the chief of the pressing forward trees. The trees of second rank under it are not deciduous.

PLATE IX. A. Looking up the Dihong river from the stockade of Yambung camp through a small plantation of *Artocarpus integrifolia*, at the shingle and boulder banks bared in January.

B. Looking up the Dihang in the gorge under Rotung, showing the rocky bed of which fifty feet (vertically) will be covered in the rainy season. On this zone, *Homonioia*, *Rhabdia*, *Arundinella*, etc., the plants enumerated on p. 36, lead an amphibious existence.

PLATE X. A. A shingle bed in the river at Kobo, bared in January, dotted with trees of *Homonioia riparia*, their twigs with a permanent lean in the direction of the current.

B. An uncovered *Homonioia* showing that it has a trunk in the shingle.

Plate I.



A



Photo. - Engraved & printed at the Offices of the Survey of India, Calcutta, 1913.

B

Plate II.

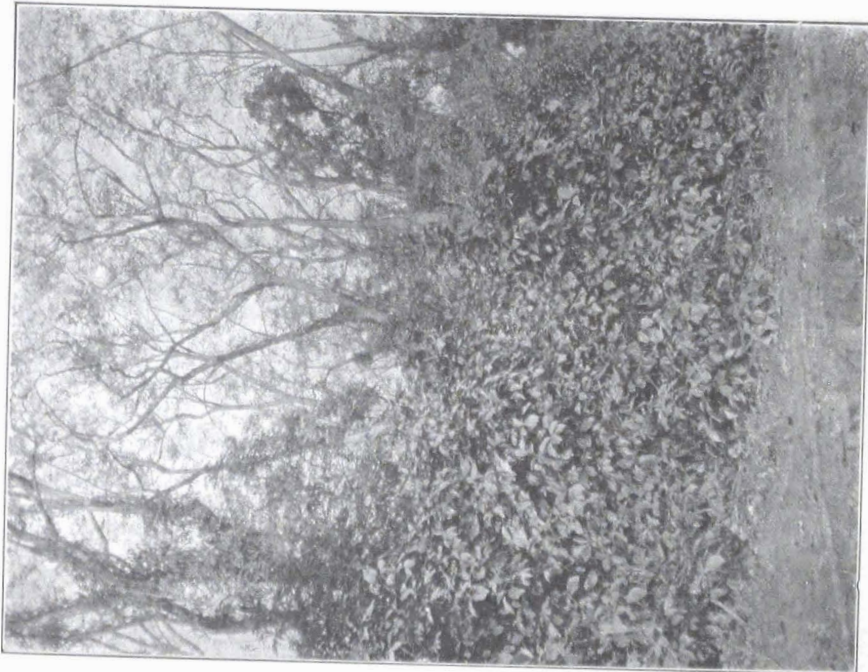
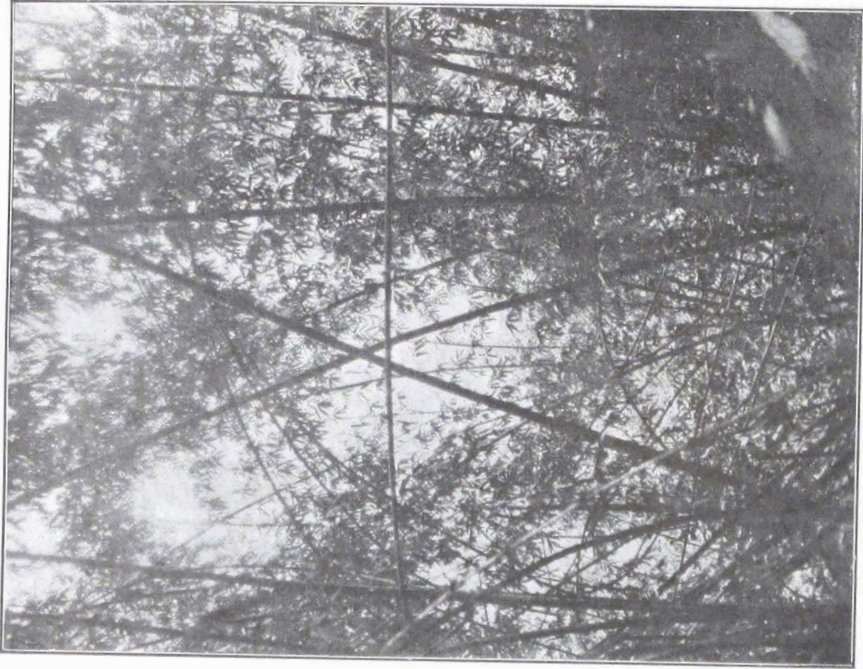


Photo -Engraved & printed at the Offices of the Survey of India, Calcutta, 1913.

A

B

Plate III.

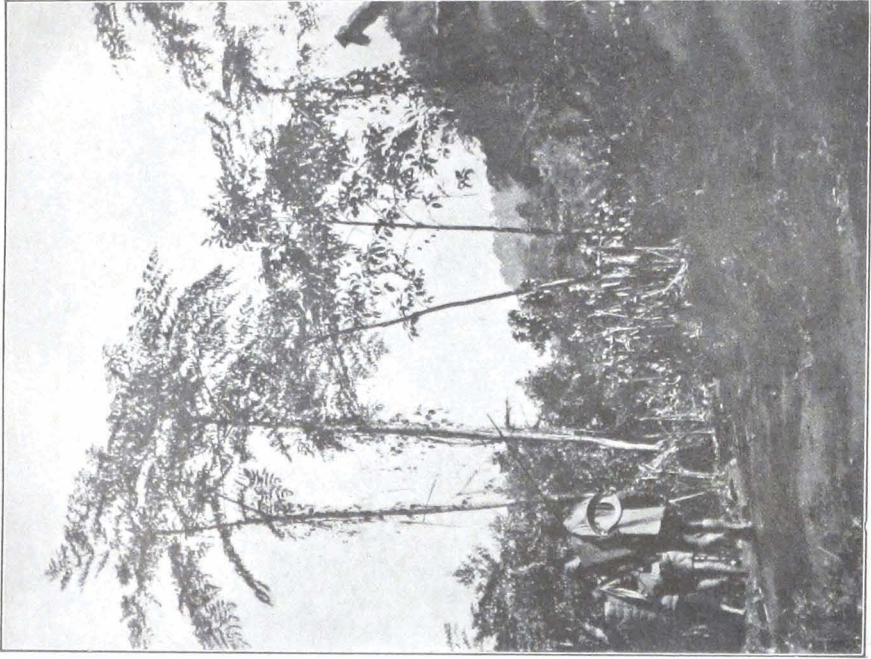


Photo -Engraved & printed at the Offices of the Survey of India, Calcutta, 1913.

B



A

Plate IV.

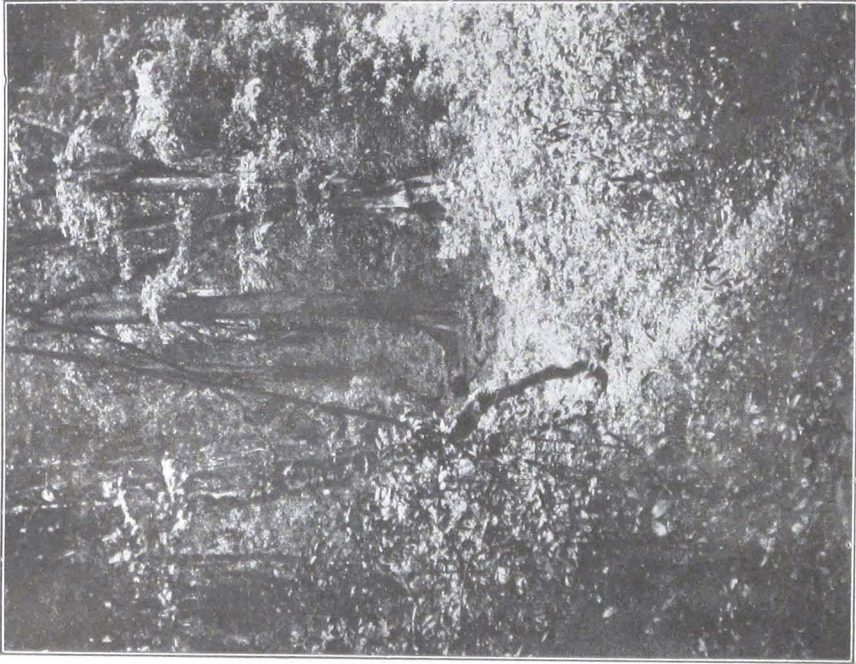


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A

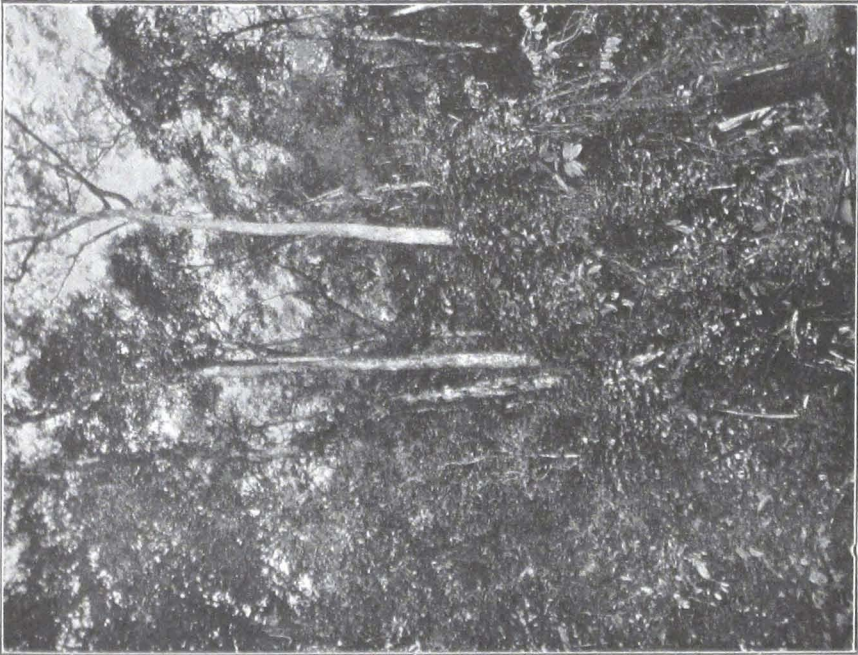
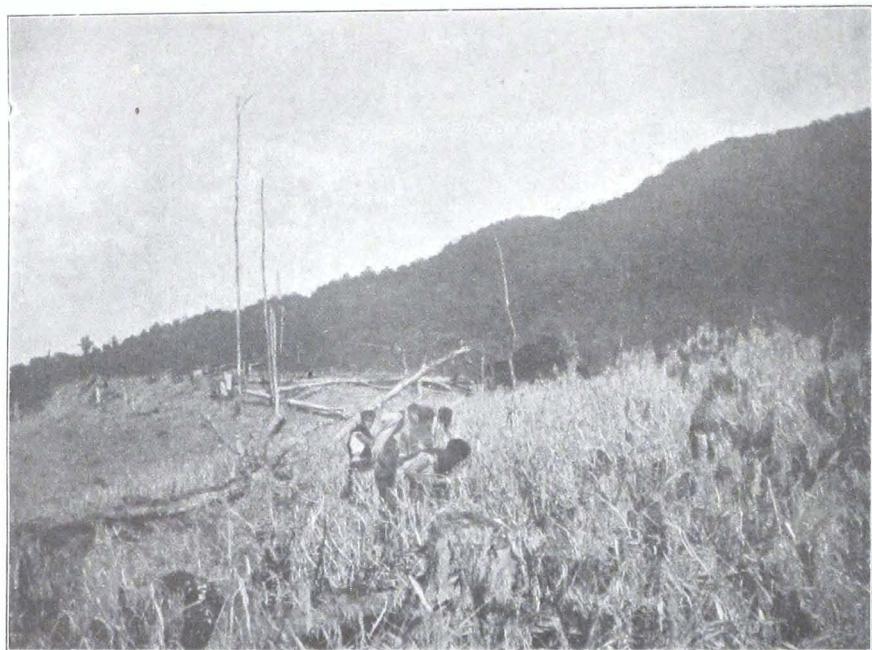


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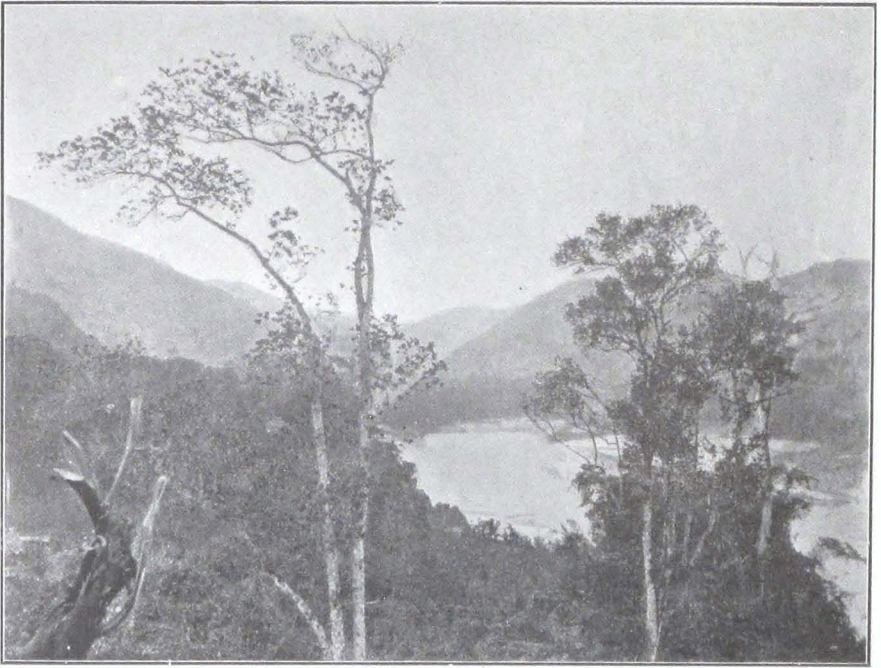


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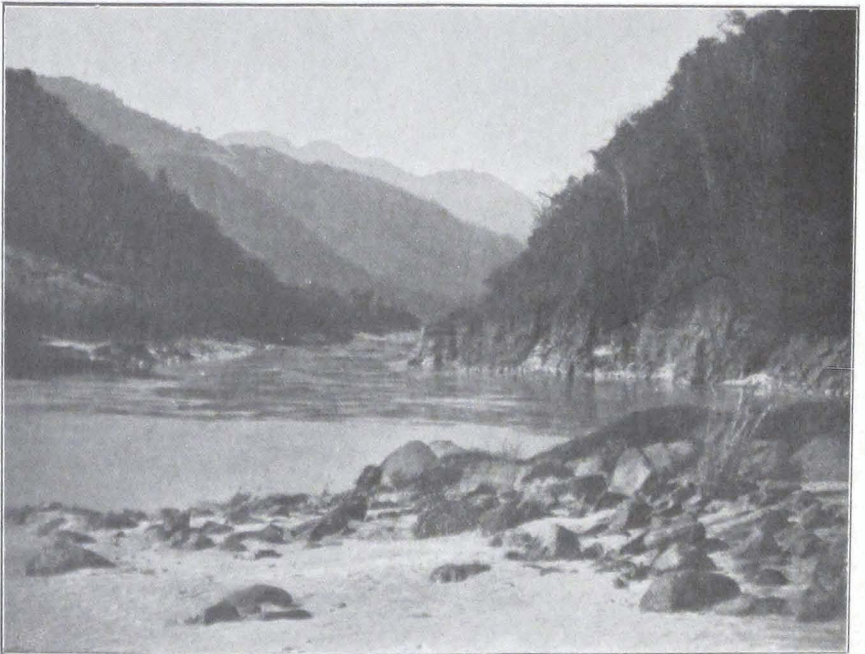


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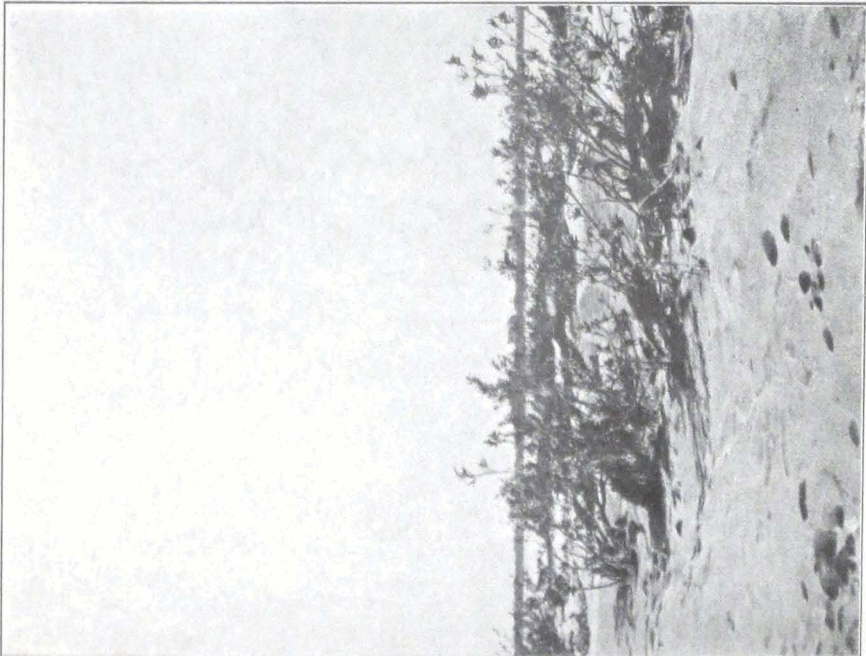
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Plate X.



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